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ABSTRACT

The major goal of the Comprehensive Instructional Management System for mathematics is to provide the classroom teacher in New York City with a well-structured, objective-based curriculum. This first part of the manual for Level 4 includes modules for 14 topics: (1) numbers and numeration; (2) addition of whole numbers; (3) subtraction of whole numbers; (4) multiplication of whole numbers; (5) division of whole numbers; (6) fractions; (7) decimals; (8) integers; (9) geometry; (10) measurement; (11) algebraic concepts; (12) graphs, probability and statistics; (13) problem solving; and (14) review. The recommended instructional sequence is listed, followed by the content listed by topic. Reinforcement of previously learned skills is incorporated. Each objective is considered, with vocabulary, activities for getting started, and teaching strategies to use. The pupil's worksheets are interspersed. Resource materials, symbols, and equipment lists are included.
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CIMS

COMPREHENSIVE INSTRUCTIONAL MANAGEMENT SYSTEM

A Cyclical Mathematics Curriculum

PART 1—TEACHER



NEW YORK CITY BOARD OF EDUCATION
OFFICE OF CURRICULUM DEVELOPMENT AND SUPPORT
DIVISION OF CURRICULUM & INSTRUCTION

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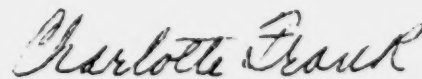
FOREWORD

The Comprehensive Instructional Management System (CIMS) is a unified mathematics curriculum for grades K-7. The curriculum is cyclical in design, and reflects the most recent New York City and New York State guidelines.

Utilizing the experience of our system's teachers, we have developed a teacher-designed curriculum that includes a rich selection of classroom-tested successful mathematics activities. The major goal of the CIMS mathematics project is to provide the classroom teacher with a well-structured, objective-based curriculum. All objectives are supported by a variety of strategies. Student mastery of these objectives is readily diagnosed through the system's testing component.

The curriculum format is structured to allow the teacher to determine the ability level of the students in the topic under study, and to permit the students to move forward at their individual rates. Each module of instruction provides the teacher with a set of related performance objectives. These objectives are supported by activities which probe and develop the students' readiness to undertake new skills and concepts. Further reinforcement is given to mastery of the objectives through accompanying student workbooks.

It is hoped that this curriculum will not only assist teachers in developing vital mathematics instruction, but will serve to expand and enrich students' mathematics skills.



Charlotte Frank,
Executive Director
Division of Curriculum and Instruction

ACKNOWLEDGMENTS - 1986

The Comprehensive Instructional Management System (CIMS) was developed as a project of the Division of Curriculum and Instruction, Mrs. Charlotte Frank, Executive Director. Mr. Bernard Mecklowitz, Community School Superintendent CSD 1; Dr. Peter Negroni, Community School Superintendent CSD 12; Dr. Harvey Garner, Community School Superintendent CSD 18; Mr. Carlos Edwards, Community School Superintendent CSD 23, and Mr. Joseph Pacheco, Community School Superintendent CSD 32 supervised the overall development of the CIMS program within their respective districts.

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INTRODUCTION

The Comprehensive Instructional Management System (CIMS) is a teacher-designed educational delivery system composed of a curriculum, a testing component and a computer managed reporting system.

Designed to support mathematics instruction in the classroom, CIMS provides a comprehensive cyclical mathematics curriculum for grades K through 7. Each manual describes the curriculum for a single level or grade. Teacher curriculum developers from elementary, intermediate and senior high schools utilized the most current New York City and New York State guidelines in formulating the curriculum's modules and sequence.

Curriculum Topics

The CIMS mathematics curriculum has been organized into the following 14 topics:

- .01 Numbers and Numeration
- .02 Addition of Whole Numbers
- .03 Subtraction of Whole Numbers
- .04 Multiplication of Whole Numbers
- .05 Division of Whole numbers
- .06 Fractions
- .07 Decimals
- .08 Integers
- .09 Geometry
- .10 Measurement
- .11 Algebraic Concepts
- .12 Graphs, Probability, Statistics
- .13 Problem Solving
- .14 Review

Modules of Instruction

The CIMS curriculum is organized into modules or groupings of similar skills or understandings. Each module has a suggested period of duration for student mastery, a listing of new skills to be mastered by the student in the form of performance objectives, a section devoted to vocabulary, terms and symbols, getting started activities which serve as prerequisite skills in preparation for undertaking new objectives, strategies for teaching the new skills and student activities for providing reinforcement for the newly learned objective. Note that

the lesson duration is included only as a guideline to the teacher for planning purposes. The actual time required for each module will vary from class to class and from child to child depending on the needs of the students and the teacher's judgment.

Priorities of Performance Objectives

There is an order of priority to be recognized in teaching the content presented in the CIMS NEW YORK CITY MATHEMATICS CURRICULUM. Performance objectives with the greatest priority are so basic that unless the student acquires a satisfactory degree of competency in them, the student cannot progress. Such topics are marked A and mastery by all pupils is essential.

Performance objectives marked B are required to be presented to all students. Mastery is not expected at this time. These objectives will be developed further and reinforced later.

Performance objectives marked C are of special interest. These should be taught to increase positive attitudes towards mathematics.

Summary: A - Mastery of this objective is essential for progress.

Opportunities for reinforcement should be provided throughout the school year.

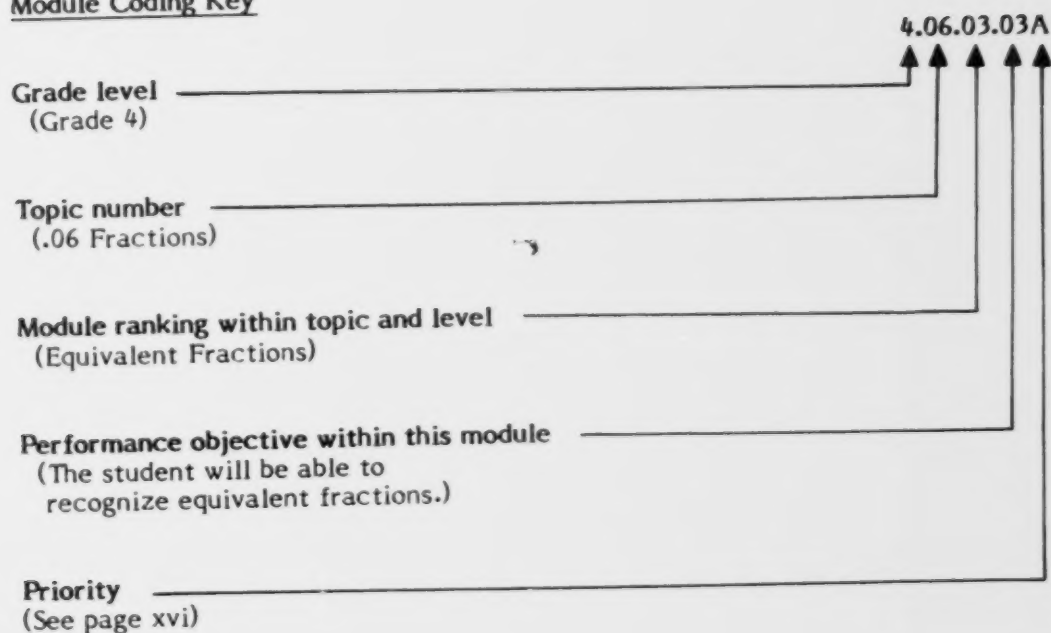
B - These objectives are to be taught to all pupils. Mastery is not essential at this time because the topics will be further developed and reinforced.

C - Objectives of special interest.

Topic Tab Key

01. Numbers and Numeration
02. Addition of Whole Numbers
03. Subtraction of Whole Numbers
04. Multiplication of Whole Numbers
05. Division of Whole Numbers
06. Fractions
07. Decimals
08. Integers
09. Geometry
10. Measurement
11. Algebraic Concepts
12. Graphs, Probability, Statistics
13. Problem Solving
14. Review

Module Coding Key



INSTRUCTIONAL SEQUENCE DESCRIPTION

An instructional sequence is given in list form on the following pages for this level. The sequence has been arranged to reflect what is considered the most effective presentation of the mathematics curriculum. Each module in the list is described by its unit number, module number, title, and page location.

The CIMS tests are integrated within the manual sequence. The test number is located in the first column. Each test is designed to assess priority objectives from the preceding modules. The tests are used to determine student mastery of specific performance objectives within these modules and appear in a multiple choice format. Each performance objective code number preceded by an * indicates that the performance objective is not tested on a CIMS cumulative test.

INSTRUCTIONAL SEQUENCE - LEVEL 4

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
	1	4.14.01	Review basic addition and subtraction facts.....	1
	2	4.09.01	Solid geometric figures (space figures) and their properties.....	2
	3	4.14.02	Place value.....	3
	4	4.01.01	Place value through thousands.....	4
	5	4.12.01	Graphs.....	5
	6	4.13.01	Problem solving: use tables and graphs to locate information.....	7
	7	4.01.02	Place value of 5- and 6-digit numbers.....	8
4.01	8	4.01.03	Round 4- and 5-digit numbers.....	9
	9	4.10.01	Money to fifty dollar bill.....	10
	10	4.14.03	Review - addition.....	11
	11	4.02.01	Addition of numbers through 4-digits.....	12
	12	4.14.04	Review - subtraction.....	14
	13	4.03.01	Subtraction of 4-digit numbers.....	15
	14	4.06.01	Addition and subtraction of fractions with common denominators.....	17
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INSTRUCTIONAL SEQUENCE - LEVEL 4

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
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INSTRUCTIONAL SEQUENCE - LEVEL 4

TEST NUMBER	UNIT NUMBER	MODULE NUMBER	TITLE	PAGE NUMBER
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Unit 1

4.14.01 REVIEW BASIC ADDITION AND SUBTRACTION FACTS

(1 lesson/ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

4.14.01.01

recall the addition facts through 18;
e.g.,

$$\begin{array}{r} 4 \\ +6 \\ \hline 10 \end{array} \quad \text{or} \quad 4 + 6 = 10$$

4.14.01.02

recall the subtraction facts through 18.
e.g.,

$$\begin{array}{r} 9 \\ -6 \\ \hline 3 \end{array} \quad \text{or} \quad 9 - 6 = 3$$

VOCABULARYTERMSSYMBOLS

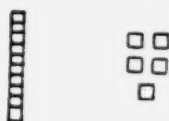
addition
subtraction
sum
difference

+

-

GETTING STARTED 1:

Prepare squared material, number name cards, and numeral cards through 18. Say, "There are many ways to represent a number. Today, we will use squared material, number name cards, and numeral cards. I will use one of those forms to represent a number from 1 through 18." e.g.,



Ask a student to find and display the numeral card. Ask another student to find and display the number name card. e.g.,



Repeat this procedure until every student has had a turn and all the numbers have been displayed. Say, "What were the three different ways we represented the numbers 1 through 18? (We used squared material, numeral cards, and number name cards.) What other ways can you represent these numbers?" (We can use Roman numerals, sticks, dot cards ...)

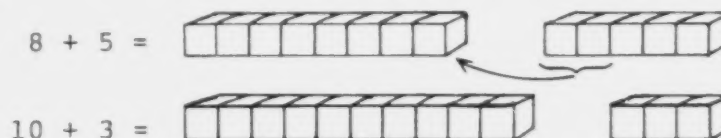
4.14.01

4.14.01.01 recall the addition facts through 18

STRATEGY 1: Prepare a set of 18 interlocking cubes (pop sticks, squared materials, ...) for each student or pair of students. Say, "Make a set of 8 cubes. Now make a second set of 5 cubes. An easy way to add these two sets is to make one of them a set of ten. How many cubes must we add to 8 cubes to make it 10 cubes? Where can we get them? (We must take 2 cubes from the group of 5 and add them to the 8 cubes to make 10 cubes.) If we move 2 from our set of 5, how many are still there?" (There are 3 left in that group.)

Draw a picture on the chalkboard to illustrate this procedure.

e.g.,



13

On the chalkboard write $8 + 5 = 13$. Say, "Could we have added to the 5 cubes to make 10? (Yes, we could have taken 5 cubes from the 8 cubes and made 10 cubes.) Which way moves the least number of cubes?"

Ask the students to read the number fact aloud and then write it in their notebooks. Repeat this procedure with other number facts through 18 where appropriate.

STRATEGY 2: Prepare a doubles chart.

e.g.,

0 + 0 = 0	5 + 5 = 10
1 + 1 = 2	6 + 6 = 12
2 + 2 = 4	7 + 7 = 14
3 + 3 = 6	8 + 8 = 16
4 + 4 = 8	9 + 9 = 18

4.14.01

STRATEGY 2:
cont'd

Say, "When two things are the same, we call them doubles. Why do we call these number pairs doubles? (Both addends are the same.) What is the sum of $7 + 7$? (The sum of $7 + 7$ is 14.) ... $6 + 6$?" (... 12.) Repeat this procedure until all the sums of the doubles have been named. Say, "If we know the sum of $7 + 7$, how can we find the sum of $7 + 8$? (We can think of the sum of $7 + 7$. Since 8 is one more than 7, the sum is one more than 14. The sum is 15.) What other fact do we know now?" (We know $8 + 7 = 15$.) On the chalkboard write $7 + 8 = 15$ and $8 + 7 = 15$. Ask the students to read the facts aloud and write them in their notebooks. Say, "If the sum of $5 + 5$ is 10, what is the sum of $6 + 5$? (The sum of $5 + 5$ is 10, so the sum of $6 + 5$ is one more, or 11.) What other fact do we now know?" (We know $5 + 6 = 11$.) On the chalkboard write $6 + 5 = 11$ and $5 + 6 = 11$. Ask the students to read the facts aloud and write them in their notebooks. Say, "How can we find the sum of $6 + 7$ using this method? (We can use $6 + 6 = 12$ and then add 1 for a sum of 13.) What other fact do we now know?" (We know $7 + 6 = 13$.) On the chalkboard write $6 + 7 = 13$ and $7 + 6 = 13$. Ask the students to read the facts aloud and write them in their notebooks.

Say, "What is another way to use our doubles chart to find that sum?" (Since 6 is one less than 7, we can use $7 + 7 = 14$ and the answer will be one less, or 13.)

Repeat this procedure with other addition facts.

Note: A doubles chart may include pictures illustrating the doubles, e.g., a pair of hands ($5 + 5$), a dozen eggs ($6 + 6$), ...

4.14.01

4.14.01.02 recall the subtraction facts through 18

STRATEGY 1: Prepare a set of 18 ones pieces (interlocking cubes, pop sticks, ...) for each student or pair of students. Say, "Start with 18 ones in the center of your desk. Take 8 ones and put them aside. How many ones are left?" (There are 10 ones left.) Write the number sentence $18 - 8 = 10$. Repeat this procedure for $17 - 7$, $16 - 6$, $15 - 5$, ... $11 - 1$. Write the facts on the chalkboard. Ask the students to read them aloud and write them in their notebooks.

Say, "How can these facts help us remember facts like $15 - 6$, $13 - 4$, ...?" (We can first subtract to ten, and then subtract the remaining ones.)

e.g.,

$$14 - 7 = \square$$

$$14 - (4 + 3) = \square$$

Think:

I still need

to subtract 3

more.

$$14 - 4 = 10 \quad \square\square\square\square\square\square\square\square\square\square$$

$$10 - 3 = 7 \quad \square\square\square\square\square\square\square\square$$

$$\text{Therefore, } 14 - 7 = 7$$

Provide the students with practice in first subtracting to ten, and then subtracting the remaining amount in the subtrahend. Repeat this procedure to help the students gain proficiency.

STRATEGY 2: Prepare and display a doubles chart as used in P.O. 4.14.01.01, Strategy 2. Say, "The doubles chart helped us find sums. It can also help us find differences. How can we use it to find differences?" (If we know that $7 + 7 = 14$, then we know that $14 - 7 = 7$.)

4.14.01

STRATEGY 2 cont'd

Ask the students to use the doubles chart to solve the following subtraction sentences:

$18 - 9 = \square$	$10 - 5 = \square$
$16 - 8 = \square$	$8 - 4 = \square$
$14 - 7 = \square$	$6 - 3 = \square$
$12 - 6 = \square$	$4 - 2 = \square$

Say, "How does knowing that $12 - 6 = 6$ help us find $12 - 7$?" (Since 7 is one more than 6, so we will have one less remaining. Therefore, $12 - 7 = 5$.) On the chalkboard write $12 - 7 = 5$. Ask the students to read the fact aloud and write it in their notebooks.

Repeat this procedure, using the doubles chart to solve other subtraction sentences.

e.g.,

$14 - 8 = \square$	$16 - 7 = \square$	$11 - 4 = \square$
$13 - 6 = \square$	$12 - 7 = \square$	$17 - 9 = \square$
$15 - 8 = \square$	$11 - 6 = \square$	$17 - 8 = \square$

Say, "Which double can help us solve $14 - 8 = \square$?"

(We know that $14 - 7 = 7$, so $14 - 8$ will be 1 less, or 6.) On the chalkboard write $14 - 8 = 6$. Ask the students to read the fact aloud and write it in their notebooks. Repeat this procedure, until the students have had an opportunity to subtract by demonstrating an understanding of doubles and near doubles.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Add across and down to find the magic sum.

Add →

↓

3	6	9
4	4	8
7	10	17

7	2	
6	3	

4	5	
2	1	

9	4	
0	0	

3	2	
4	3	

Write your own.

Subtract across and down to find the magic difference.

Subtract →

↓

7	4	3
4	2	2
3	2	1

9	5	
8	5	

13	7	
9	5	

16	7	
9	4	

12	7	
6	2	

Write your own.

Unit 2

4.09.01 SOLID GEOMETRIC FIGURES (SPACE FIGURES)
AND THEIR PROPERTIES
(2 lessons)

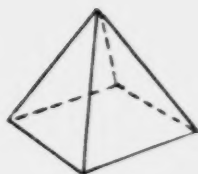
PERFORMANCE OBJECTIVES9

The student will be able to...

- 4.09.01.01A recognize and name various solid geometric figures (space figures);
e.g.,



rectangular
prism



pyramid



cone



cube



cylinder

- *4.09.01.02A identify solid geometric figures in the
environment;
e.g.,



door



cone

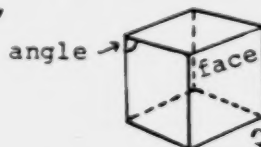


brick

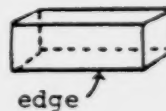


can

- 4.09.01.03A identify and define faces, edges, angles,
right angles, line segments, and vertices of
solid geometric figures.
e.g.,



32



VOCABULARYTERMS

rectangular prism	vertex
pyramid	edge
cone	plane
cube	angle
cylinder	right angle
solid figure	line segment
face	

GETTING STARTED 1:

Prepare and distribute geoboards and rubber bands to groups of students. Say, "Use a rubber band to make a square on the geoboard. Why is this figure called a square? (A figure is a square if the 4 sides are equal and the corners, or angles, are square.) Now use your rubber band(s) to make a rectangle on the geoboard. How is the rectangle like the square? (The rectangle and the square both have 4 sides and 4 square corners.) How are they different? (Only the opposite sides of the rectangle are equal in length. All 4 sides of the square are equal.) Now use your rubber band(s) to make a three-sided closed figure. What is the name of this figure? (A three-sided closed figure is called a triangle.) How many angles, or corners, does it have? (A triangle has 3 angles or corners.) All the figures we have constructed on the geoboards were flat. We use the term plane figures to describe figures or shapes on a flat surface." Write the title Plane Figures on the chalkboard and ask a student to draw a rectangle, a triangle, and a square below the title.

e.g.,

Plane Figures

Ask the students to create other plane figures on their geoboards.

GETTING STARTED 1: cont'd

Ask several students to describe the plane figures they made and to draw them on the chalkboard under the title, Plane Figures. Say, "Why are all of these figures called plane figures?" (They are called plane figures because they are flat.) Ask the students to describe the plane figures on the chalkboard or on their geoboards by saying the number of sides and angles each figure has. Ask the students to write the name of each figure below its picture on the chalkboard.

GETTING STARTED 2:

Prepare a chart showing several different shapes. Ask the students to identify each shape and write its name below its picture.
e.g.,



circle



triangle



square



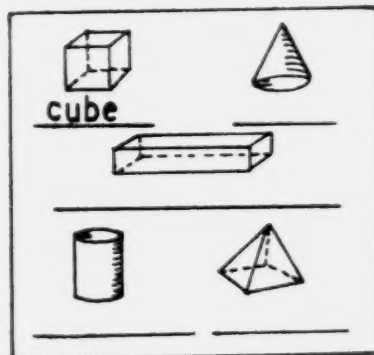
rectangle

Say, "Look around our classroom. What objects have these shapes?" Ask a student to find an object in the room that has the shape of a circle. Repeat this procedure for each shape. Say, "Are there any shapes we found more often than others? Are there any shapes we couldn't find at all? Why do you think that is?"

4.09.01

4.09.01.01 recognize and name various solid geometric figures
(space figures)

STRATEGY 1: Prepare a cube, a rectangular prism, a cylinder, a pyramid, a cone, and worksheet 2a. Display the cube. Say, "Of which plane figure does this figure remind you? (It looks like the square.) How does it remind you of a square? (Accept reasonable answers.) How is this figure different from a square? (The sides are squares, but a square is flat. This is not flat.) We call this figure a cube." Ask the students to find the picture of the cube on page 2a and label it.
e.g.,



Repeat this procedure for naming each remaining figure. Accept reasonable answers regarding the plane figure which the students are reminded of when looking at each solid figure. Say, "Why does it remind you of that plane figure? Do you see any plane figures in that solid figure? How is a solid figure different from a plane figure?" (A solid figure has thickness, a plane figure is flat.)

4.09.01

4.09.01.02 identify solid geometric figures in the environment

STRATEGY 1: Prepare large sheets of construction paper and samples of geometric figures found in the environment, e.g. a cereal box, a soup can, an ice cream cone, a cube-shaped marshmallow. Say, "We now recognize and can name solid geometric figures such as a rectangular prism, a pyramid, a cone, a cube, and a cylinder. Look at these items. Can you determine what solid geometric shapes they represent?" (The cereal box is a rectangular prism. The soup can is a cylinder...)

Distribute a magazine to each student or group of students. Say, "Look through these magazines to find pictures of the solid figures we have studied, cut them out, and place them on your desk."

Label each large sheet of construction paper with the name of one of the solid geometric shapes.

e.g.,

<u>Cube</u>	<u>Cyclinder</u>	<u>Cone</u>	<u>Rectangular Prism</u>	<u>Pyramid</u>

Say, "If you have cut out pictures of cubes, come to the chart labeled cube and paste your pictures on it." Repeat this procedure for the other solid figures. Say, "Which figure was found most often? Why do you think that may be?"

4.09.01.03 identify and define faces, edges, angles, right angles, line segments, and vertices of solid geometric figures

STRATEGY 1: Prepare and display a cube, a rectangular prism, a cone, a cylinder, and a pyramid.

4.09.01

STRATEGY 1:
cont'd

Say, "We have learned that solid geometric figures have several sides and are thick. If we look carefully, we will see many other features on these figures. People's faces have noses, mouths, and ears. However, geometric figures have faces that are flat, or plane. A flat surface of a geometric figure is called a **face**." Ask a student to choose the cube and display it. Say, "How many faces are on the cube? (The cube has 6 faces.) What is the shape of each face?" (Each face on the cube is a square.) Repeat this procedure for describing and counting the faces on the other solid figures.

Ask a student to choose the rectangular prism and display it. Say, "Let's pretend that Annie the Ant was walking on the top of this block. She reached the place where she couldn't go any further, but she wasn't looking where she was going. What will happen when she takes another step?" (She'll fall off the edge.) Repeat this procedure with the block standing on end. Let the children discover that no matter how the block is placed, there will still be edges. Elicit that the edge is the place where two faces meet. Ask several students to find edges on the other solid figures. Say, "What do you notice about each edge? (The edge is sharp, not rounded.) An edge is usually a straight line, or a line segment. Which solid geometric figure has an edge that is not a straight line?" (The cylinder has an edge that is not a straight line.)

Hold up the cube and point to a corner where two edges meet. Say, "What are corners? (Corners are places where two edges, or line segments, meet.) A corner is called a **vertex**. When line segments meet at a vertex, the space between them is called an **angle**. Look at the cube or the rectangular prism. What kind of angle is in each corner? (Every corner

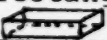
4.09.01

STRATEGY 1: has a square angle.) These square angles are called **right angles.**" Ask the students to point to other angles on the different solid figures and to indicate which angles are right angles.

cont'd

Hold up each figure, one at a time, and ask the students to describe the figures using the new terms. Write the definition of each new term on the chalkboard. Illustrate the solid geometric figures on the chalkboard and identify each of the new terms for each figure.

STRATEGY 2: Prepare a cube, a rectangular prism, a cone, a pyramid, a cylinder, and a duplicated sheet with a chart of solid geometric figures.
e.g.,

Shape			
 cube			
 rectangular prism			
 cone			
 pyramid			
 cylinder			

Display the figures and distribute the duplicated sheet. Say, "The flat sides of a solid figure are called faces." Write the definition of face on the chalkboard. Ask a student to point to a face of the cube. Say, "How many faces does a cube have? (A cube has 6 faces.) Label the first column on your chart Number of Faces and write 6 in that column next to the cube." Repeat this procedure for faces on the other figures. Say, "Where the faces meet is called an edge?" On the chalkboard, write the

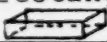
4.09.01

STRATEGY 2: cont'd

definition of edge and say, "Label the second column Number of Edges. How many edges does the cube have?" (A cube has 12 edges.) Ask the students to write 12 in the correct place on their chart. Repeat this procedure for the edges on the other figures.

Say, "Where edges meet is called a vertex." On the chalkboard, write the definition of vertex and say, "Label the third column Number of Vertices. How many vertices does a cube have?" (A cube has 8 vertices.) Ask the students to write 8 in the correct place on their charts. Repeat this procedure for the other figures.

e.g.,

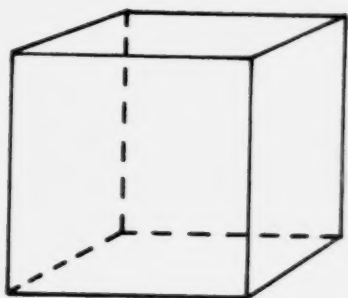
Shape	Number of Faces	Number of Edges	Number of Vertices
 cube	6	12	8
 rectangular prism	6	12	8
 cone	1	0	1
 pyramid	5	8	5
 cylinder	2	0	0

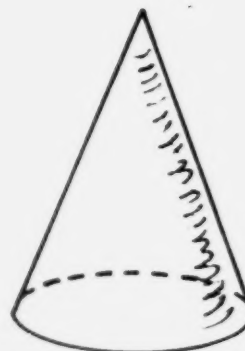
Say, "The space on each face where the edges, or line segments, come together is called an angle." On the chalkboard write the definition of angle and say, "If the edges meet in a square angle, we call that a right angle. Which figures have right angles?" (The rectangular prism, the cube, and the pyramid have faces with right angles.)

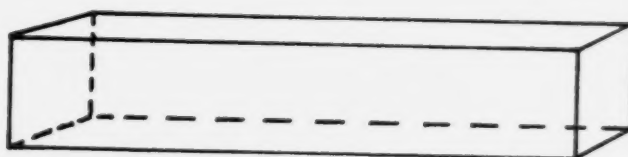
Note: A variation might be to create one large chart which, when completed, may be displayed in the room for easy reference.

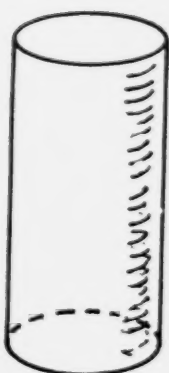
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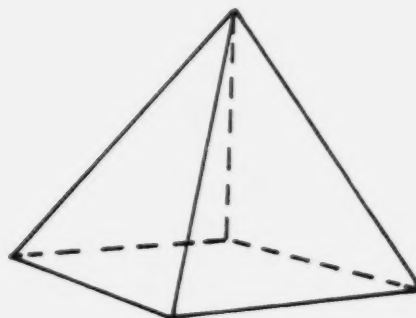
Use this worksheet with strategy 1.







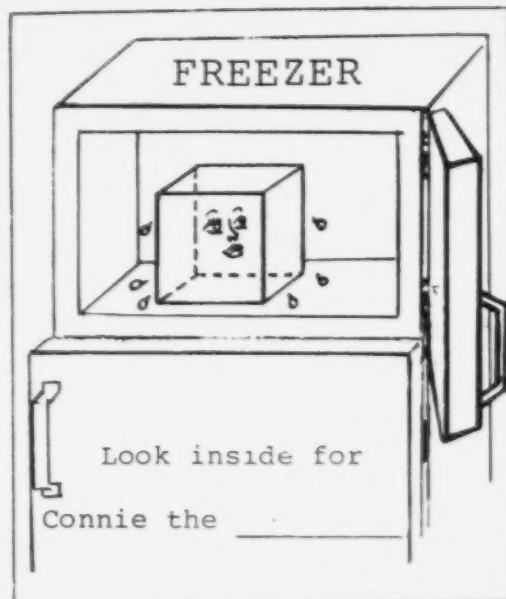
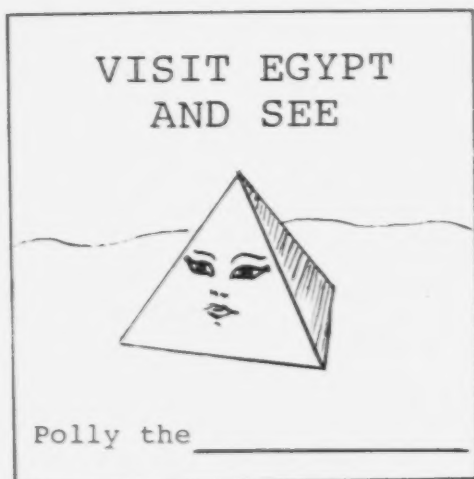
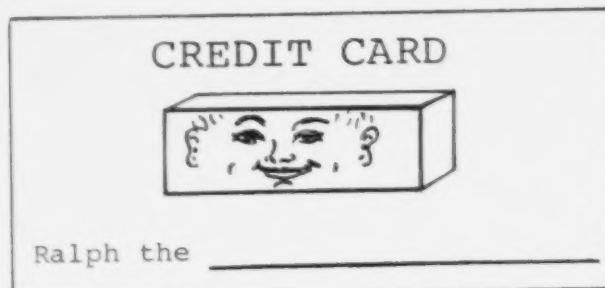
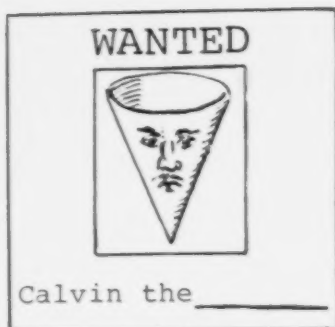




NAME: _____ CLASS: _____ DATE: _____

Write the name of the solid geometric figure on the line below each picture.

Do you know me?



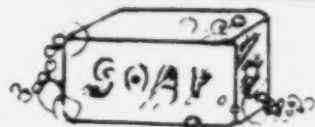
NAME: _____ CLASS: _____ DATE: _____

In each example below there are objects we see every day.
Write the name of the shape of each object.

What Shape Am I?

Ice is a cube.

A party hat is a _____.



A bar of soap is a _____.



A refrigerator is a _____.



A roll of paper towels is a _____.



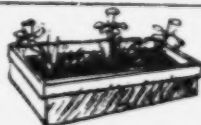
An Indian tent is a _____.



A can of soda is a _____.



Dice are _____.



A flower box is a _____.

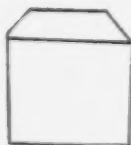


An ice cream cone is a _____.

CHALLENGE!

MISSING IN ACTION

In each shape below, you see some of its faces.
How many faces can't you see?



cube



cone



cylinder



rectangular prism

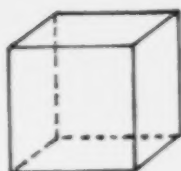


pyramid

NAME: _____ CLASS: _____ DATE: _____

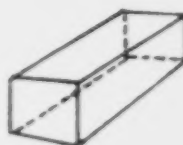
Follow the directions below.

On the lines below the pictures, write the number of faces each figure has.



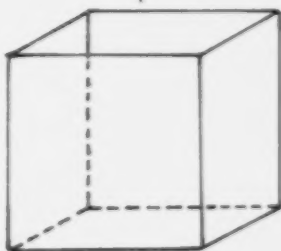








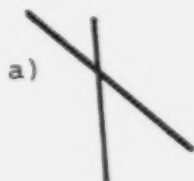
Use a red crayon to draw a point on each vertex of this cube. Use a green crayon to trace each edge.



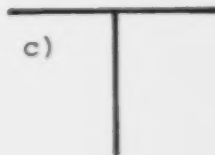
A cube has _____ vertices.

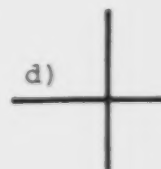
A cube has _____ edges.

When line segments meet or cross, angles are formed. How many angles are formed in each picture below?









Circle the letter of the pictures which show right angles: a b c d

How many right angles can you count in all? _____

Unit 3

4.14.02 PLACE VALUE

(1 lesson/ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

4.14.02.01

count by tens and hundreds through one thousand;

e.g.,

count orally by tens

10, 20, 30,... 100

110, 120, 130,... 220

870, 880, 890,... 1,000

count orally by hundreds

100, 200, 300,... 1,000

4.14.02.02

identify and write a 4-digit number in expanded notation;

e.g.,

$$4,675 = 4,000 + 600 + 70 + 5$$

4.14.02.03

identify and write a 4-digit number in standard form given the expanded notation.

e.g.,

$$3,000 + 700 + 40 + 1 = 3,741$$

VOCABULARY**TERMS**

expanded notation
standard form

GETTING STARTED 1:

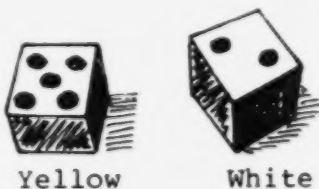
Prepare and distribute squared material (10 tens and 10 ones) to each student or group of students. Say, "We will use squared material to count by ones from 1 to 100. Let's count the ones together. (1,2,3, ...10.) We have used up all our ones. What can we do to keep counting?" (We can exchange the 10 ones for 1 ten. Then we can continue counting.) Ask the students to make the exchange. Say, "We have 1 ten. Let's continue counting by ones. Hold the ten in your hand and use the ones to continue counting. (11,12,13, ...20.) We have used up our ones again. What must we do again if we want to continue counting?" (We must exchange the 10 ones again for 1 ten.) After the exchange say, "Hold 2 tens in your hand. What number is represented by 2 tens?" (2 tens represents 20.)

Repeat this procedure for counting by ones through 100, exchanging 10 ones for 1 ten with each new decade.

GETTING STARTED 2:

Prepare and distribute pairs of different color dice to each student or group of students. Say, "The yellow die represents tens. The white die represents ones. Roll your dice."

e.g.,



Say, "What number is represented by the five dots on the yellow die and the two dots on the white die?" (The number 52 is represented by

GETTING STARTED 2: cont'd

the dice.) Ask a student to write 52 on the chalkboard. Repeat this procedure several times.

Say, "What is the lowest number you can make rolling the pair of dice? (11 is the lowest because the least number on each die is one.) Are there any 2-digit numbers you can't make with these dice?" (We can't make any numbers with zeros. We can't make any number greater than 66.)

4.14.02

4.14.02.01 count by tens and hundreds through one thousand

STRATEGY 1: Prepare and distribute squared material (10 hundreds and 10 tens) to each student or group of students. Ask a student to count from 1 through 10. Say, "We have used ones squares to count by ones. What should we use to count by tens? (We should use the tens strips to count by tens.) Remember, when we counted by ones we exchanged 10 ones for 1 ten. What do you think we should do when we count 10 tens?" (We can exchange 10 tens for 1 hundred.) After the exchange has been made say, "Now add one ten to your hundred square. What is your new number? (My new number is 110.) Add another ten. What is your new number?" (My new number is 120.)

Repeat this procedure through 190. Say, "What should we do when we add another ten?" (We can exchange 10 tens for another hundred.) Continue to count by tens, exchanging 10 tens as the students reach each hundred.

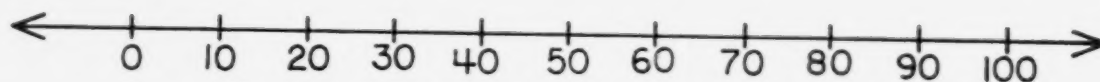
Say, "If we add 1 ten to 990, what number will we have?" (We will have 10 hundreds, or 1 thousand.)

Ask the students to count their hundreds. Say, "If we have 1 hundred square, how much do we have? ... two hundred squares? ... ten hundred squares?" If we have one hundred square we have 100... 200... 1,000.) Ask a student to count the hundred squares from one hundred through 10 hundred, or 1 thousand.

Say, "When we reached 10 ones, what did we do? (We traded our ones for one ten.) When we reached 10 tens, what did we do? (We traded our tens for one

STRATEGY 1: hundred.) What can we do when we reach 10 hundreds?
 cont'd (We can exchange it for a thousand block or we can
 put a rubber band around the 10 hundred boards and
 rename them 1 thousand.) In our number system, what
 happens each time you have a group of ten?" (We
 trade the ten for 1 in the next higher place.)

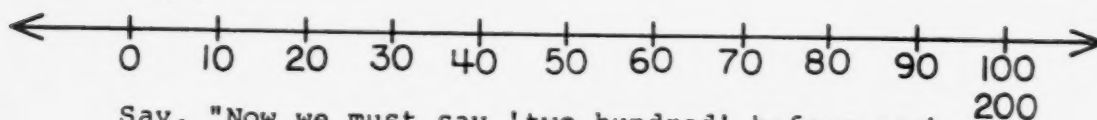
STRATEGY 2: Prepare and display a number line on the chalkboard.
 e.g.,



Say, "We can use this number line to count by tens."
 Ask the students to count by tens through 100. Say,
 "We can easily count by tens beyond 100 using this
 number line. What number is ten more than 100? (110
 is ten more than 100.) We must remember to say 'one
 hundred' before each number, beginning with the 10,
 and go through the number line again."

When the students reach 200, write the numeral 200
 under the 100 on the number line.

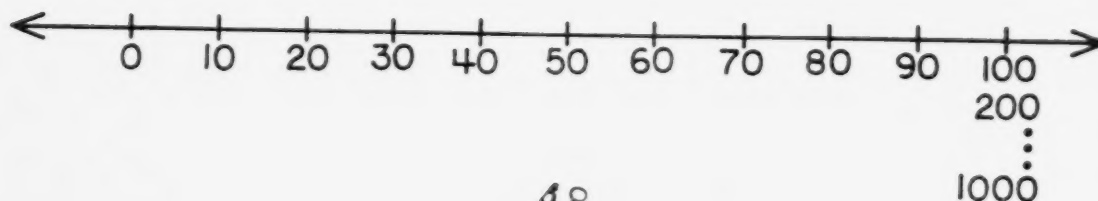
e.g.,



Say, "Now we must say 'two hundred' before each
 number, beginning with 10, on the number line."

Repeat this procedure through ten hundreds or one
 thousand, writing each new hundred below the previous
 one or the number line.

e.g.,



4.14.02

STRATEGY 2: Ask the students to use the numbers written below the hundred to help them count by hundreds to one thousand.
cont'd

4.14.02.02 identify and write a 4-digit number in expanded notation

STRATEGY 1: Prepare and display a place value chart.
e.g.,

thousands	hundreds	tens	ones

On the chalkboard write 3,675. Ask a student to read the number. Say, "In the number 3,675 how many thousands are there? (There are 3 thousands.) ... hundreds? (... 6 hundreds.) ... tens? (... 9 tens) ... ones?" (... 5 ones.) Ask a student to record the number on the place value chart. Say, "What is the value of 3 in the thousands place?" (3 in the thousands place equals 3,000.) Repeat this procedure for each digit. On the chalkboard write $3,675 = 3000 + 600 + 70 + 5$.

Say, "This form of the number is called expanded notation." Repeat this procedure with other 4-digit numbers, asking students to write the number on the place value chart and then in expanded notation.

4.14.02.03 identify and write a 4-digit number in standard form given the expanded notation

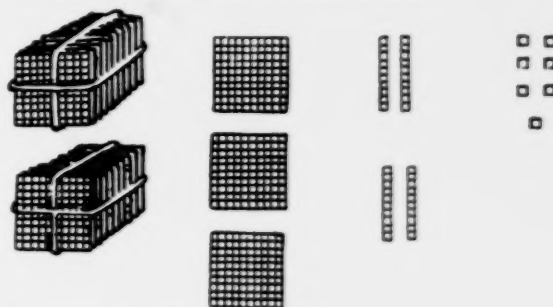
STRATEGY 1: Prepare squared material and a place value chart. Display the place value chart and a number using the

STRATEGY 1: squared material representing 2,347. (A 1000 block may be made by placing a rubber band around ten hundred squares.)

cont'd

e.g.,

thousands	hundreds	tens	ones



Say, "How many thousands are represented? ...hundreds? ...tens? ...ones?" (There are 2 thousands ...3 hundreds ...4 tens ...7 ones.) Ask a student to write this information on the place value chart.

e.g.,

thousands	hundreds	tens	ones
2	3	4	7

Say, "What is the number represented by the 2 in the thousands column? (The 2 represents 2000.) What does the 3 in the hundreds column represent? (... 300.) Repeat this procedure for each digit.

On the chalkboard write $2000 + 300 + 40 + 7$. Say, "If we add all these numbers together what number will we have?" (We will have 2,347.)

On the chalkboard write $2000 + 300 + 40 + 7 = 2,347$. Ask the students to write this in their notebooks. Say, "We knew how to write a number in expanded form. Now numbers written in expanded form are being written in standard form. How did the place value chart help us?" (It showed us the value of each digit.)

Repeat this procedure with other 4-digit numbers.

STRATEGY 2: Prepare 4 sets of number cards:

1,000 2,000 ... 9,000 10 20 ... 90

100 200 ... 900 1 2 ... 9

Shuffle each set of cards and place them in 4 piles on a desk. Ask a student to pick one card from each pile and tape them on the chalkboard. Write a plus symbol between the pairs of cards.

e.g., $\boxed{5,000} + \boxed{300} + \boxed{80} + \boxed{6} = \underline{\hspace{2cm}}$

Say, "This is the expanded form of number." Ask a student to come to the chalkboard and write the standard form of the expanded number.

e.g., $\boxed{5,000} + \boxed{300} + \boxed{80} + \boxed{6} = \underline{5,386}$

Occasionally, ask the students to select a card from each of three piles.

e.g., $\boxed{1,000} + \boxed{800} + \boxed{6} = \underline{1,806}$

Repeat this procedure until several students have had a turn.

Say, "When we change a number from expanded notation to standard form does the value of the number change? (No.) How can you be sure?" (The place value of each digit is the same.)

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Count by tens and write the missing numbers in each row.

A. 120, 130, _____, _____, _____, 170, _____, _____, _____

B. 750, 760, _____, _____, 790, _____, _____, 820, _____

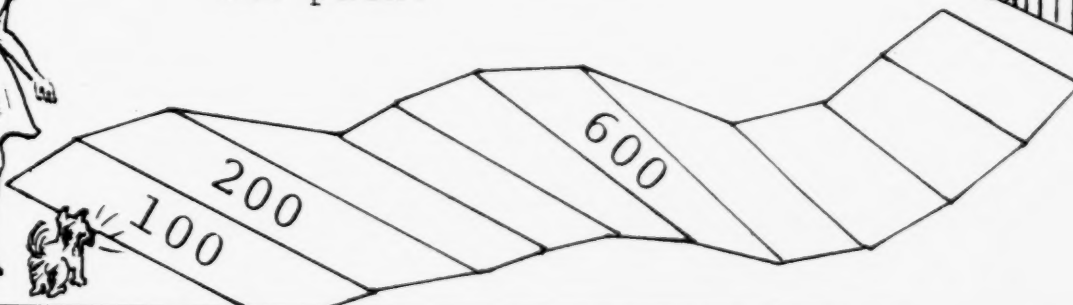
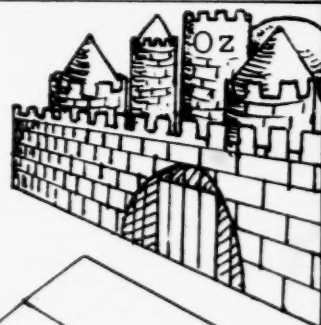
C. 490, 500, _____, _____, _____, _____, 550, _____, _____

D. 280, 290, _____, _____, _____, 330, _____, _____, 360

E. 660, 670, _____, _____, _____, _____, 720, _____, _____



Help Dorothy get to
Oz. Count by hundreds
and write the missing
numbers to complete
the path.



Do you remember?

$4 \times 6 = \square$

$3 \times 7 = \square$

$6 \times 6 = \square$

$$\begin{array}{r} 7 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ \times 5 \\ \hline \end{array}$$

Follow the directions below.

Write each number in expanded notation.

a. $7,643 = 7000 + 600 + 40 + 3$

b. $3,974 =$ _____

c. $1,405 =$ _____

d. $8,830 =$ _____

e. $5,079 =$ _____

f. $2,751 =$ _____

g. $6,200 =$ _____

Write each expanded number in standard form.

a. $5,000 + 700 + 20 + 8 =$ _____ d. $8,000 + 70 + 1 =$ _____

b. $2,000 + 200 + 30 =$ _____ e. $4,000 + 500 + 50 + 7 =$ _____

c. $6,000 + 900 + 10 + 5 =$ _____ f. $1,000 + 800 + 70 + 6 =$ _____

Draw a line to connect each number with its expanded form.

6,543

 $6,000 + 400 + 50$

6,504

 $6,000 + 500 + 40 + 3$

6,450

 $6,000 + 500 + 30 + 4$

6,534

 $6,000 + 500 + 4$ **CHALLENGE!**

Write the number represented by the words below.

one thousand two hundred eighty-four = _____

six thousand twenty-five = _____

four thousand eight hundred seven = _____

SHARPENING YOUR SKILLS

Units 1, 2, 3

Name: _____ Class: _____ Date: _____

1. $5 + 7 = \square$

(a) 11

(c) 2

(b) 12

(d) 13

8. Write the missing numbers.

10, 20, _____, _____, _____, 60

2. $12 - 9 = \square$

(e) 3

(g) 21

(f) 4

(h) 17

9. Write the missing numbers.

150, 160, _____, _____, _____, 200

3. 18

-9

$\square$

(a) 8

(b) 9

(c) 11

(d) 10

10. Write the missing numbers.

300, 400, 500, _____, _____, _____

4. 8

$+6$

$\square$

(e) 15

(f) 3

(g) 2

(h) 14

11. $4,786 = ?$

(a) $4,000 + 700 + 60 + 8$

(b) $4,000 + 700 + 80 + 6$

(c) $4,000 + 700 + 60$

(d) $4,000 + 800 + 70 + 6$

5.



This figure is a _____.

6.



This figure is a _____.

7.



This figure is a _____.

12. $3,000 + 50 + 7 = ?$

(e) 3,577

(g) 3,507

(f) 357

(h) 3,057

54

4.01.01 PLACE VALUE THROUGH THOUSANDS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*4.01.01.01A

regroup hundreds as thousands;

e.g.,

20 hundreds = 2 thousand = 2,000

4.01.01.02A

regroup thousands as hundreds;

e.g.,

3 thousand = 30 hundreds

8000 = 80 hundreds

4.01.01.03A

order 4-digit numbers in both increasing
and decreasing orders.

e.g.

4,365 5,816 4,728

in increasing order is

4,365 4,728 5,816.

7,132 7,518 7,422

in decreasing order is

7,518 7,422 7,132.

VOCABULARYTERMS

expanded notation
standard form

GETTING STARTED 1:

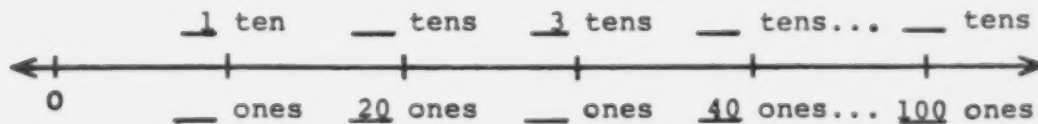
Prepare squared material (interlocking cubes, abaci) to show tens and hundreds. Display a tens strip. Say, "Each time we count 10 ones, we exchange them for 1 ten. How many ones could we exchange for 2 tens? 3 tens? ... 9 tens?" (We could exchange 20 ones for 2 tens ... 30 ones for 3 tens ... 90 ones for 9 tens.) Write the students' responses on the chalkboard.

e.g.,

10 ones = 1 ten	60 ones = 6 tens
20 ones = 2 tens	70 ones = 7 tens
30 ones = 3 tens	80 ones = 8 tens
40 ones = 4 tens	90 ones = 9 tens
50 ones = 5 tens	100 ones = 10 tens

Say, "What pattern do you notice?" (The numbers indicating how many tens can be made is the same as the first digit in the number of ones.) Ask the students to use the information on the chalkboard to complete a number line through 10 tens and 100 ones.

e.g.,



Say, "How many ones equal 1 ten? (10 ones equal 1 ten.) How many ones equal 6 tens? (60 ones equal 6 tens) If we exchange 8 tens for ones, how many ones would we have?" (We would have 80 ones.)

4.01.01

GETTING STARTED 2:

Write three 3-digit numbers on the chalkboard.

e.g.,

426

287

375

Say, "How do we write numbers in increasing order?" (We write them from least to greatest.) Ask a student to rewrite the numbers on the chalkboard in increasing order. Say, "How did you decide which number to write first?" (The greatest place value was hundreds so I compared the hundreds. 2 hundred is the least, then 3 hundred is greater, and 4 hundred is greatest.)

Repeat this procedure with 3-digit numbers having the same digit in the hundreds place.

e.g.,

741

712

703

Say, "When the highest place value digit is the same, how can we compare the numbers?" (We compare the digits in the next column to the right.) Ask a student to rewrite these numbers in increasing order at the chalkboard.

Repeat this procedure for writing 3-digit numbers in decreasing order.

4.01.01

4.01.01.01 regroup hundreds as thousands

STRATEGY 1: Prepare and display squared material (hundreds, tens, and ones). Say, "How many ones equal one ten?" (10 ones equal 1 ten.) Ask a student to use the squared material to show this. Say, "How many tens equal 1 hundred?" (10 tens equal one hundred.) Ask a student to show this using squared material. When 10 hundreds have been counted, place a rubber band around them. Say, "What number does 10 hundreds represent?" (10 hundreds represent one thousand.) Make another group of 10 hundreds. Say, "How many hundreds are there now?" (There are 20 hundreds.) Put a rubber band around each group of 10 hundreds. Say, "If 10 hundreds equal 1 thousand, how many thousands can we make with 20 hundreds?" (We can make 2 thousands with 20 hundreds.)

Repeat this procedure for hundreds through 90 hundreds. Ask the students to complete a chart to tell how many thousands can be made from each group of hundreds.

e.g.,

<u>10</u> hundreds	=	1 thousand
<u>20</u> hundreds	=	_____
<u>30</u> hundreds	=	_____
<u>40</u> hundreds	=	_____
<u>50</u> hundreds	=	_____
<u>60</u> hundreds	=	_____
<u>70</u> hundreds	=	_____
<u>80</u> hundreds	=	_____
<u>90</u> hundreds	=	_____

Say, "Look at the completed chart. What pattern do you notice?" (The first digit in the number of hundreds indicates how many thousands can be made.)

4.01.01

STRATEGY 2: Prepare a duplicated sheet with multiples of 10, multiples of 100, and multiples of 1,000.

e.g.,

<u>Multiples of 10</u>	<u>Multiples of 100</u>	<u>Multiples of 1000</u>
10	100	1000
20	200	2000
30	300	3000
40	400	4000
50	500	5000
60	600	6000
70	700	7000
80	800	8000
90	900	9000

Say, "Look at the multiples of 10." Ask a student to read the multiples of 10. Say, "How many zeros do you see in each number? (There is one zero after each number.) A number with one zero after it represents that number of tens."

e.g., 60 = 6 tens

Say, "Look at the multiples of 100. How many zeros do you see in each number? (There are two zeros after each number.) A number with two zeros after it represents that number of hundreds."

e.g., 800 = 8 hundreds

Say, "How can we find the number to which 10 hundreds is equal? (We can place two zeros after the 10, so 10 hundreds = 1000 or 1 thousand.) Can you find the number that is equal to 90 hundreds?" (90 hundreds = 9000 = 9 thousand.)

Repeat this procedure with other examples. Ask the students to copy and complete the following exercise:

80 hundreds = 8000 = _____ thousands
 20 hundreds = 2000 = _____ thousands
 40 hundreds = _____ = _____ thousands

4.01.01

STRATEGY 2:

cont'd

30 hundreds =	_____	=	_____
10 hundreds =	_____	=	_____
90 hundreds =	_____	=	_____
70 hundreds =	_____	=	_____
60 hundreds =	_____	=	_____
50 hundreds =	_____	=	_____

4.01.02.02 regroup thousands as hundreds

STRATEGY 1:

Prepare and display squared material (hundreds rubber banded in stacks of ten hundreds). Hold up a stack and say, "This represents 1 thousand. How can we find how many hundreds it took to build this thousand?" (We can take a stack of hundreds apart and count the hundreds.) Ask a student to dismantle the stack and count the hundreds at the same time. Say, "How many hundreds are there in 1000?" (There are 10 hundreds in 1 thousand.) Display 2 stacks. Say, "What number does this represent? (2000 is represented.) If we take the stacks apart, how many hundreds will we have?" (We will have 20 hundreds.) Write the following on the chalkboard:

1 thousand = 10 hundreds

2 thousand = 20 hundreds

Repeat this procedure through 9 thousands and ask the students to complete a table of the information they have learned.

e.g.,

1 thousand = _____ hundreds

2 thousands = _____ hundreds

.

.

.

9 thousands = _____ hundreds

4.01.01

STRATEGY 2: Prepare and distribute the duplicated sheet used in Strategy 2, P.O. 4.01.01.01.

Say, "Look at the multiples of 10. How many zeros are in each number? (There is 1 zero in each number.) A number with one zero at the end represents that number of tens. How many tens does 60 represent?" (60 represents 6 tens.)

Say, "Look at the multiples of 100. A number with two zeros at the end represents that number of hundreds. How many hundreds does 800 represent? (800 represents 8 hundreds.) Is there another way to read the number?" (It can be read as 80 tens.)

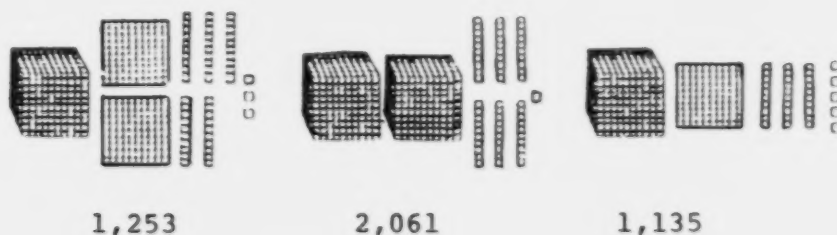
Say, "Look at the multiples of 1000. A number with three zeros at the end represents that many thousands. Therefore, 5000 = 5 thousands. We can also show 5 thousand as 5000 or 50 hundreds." On the chalkboard, write 5 thousands = 5000 = 50 hundreds.

Repeat this procedure for regrouping other thousands as hundreds.

4.01.01.03 order 4-digit numbers in both increasing and decreasing orders

STRATEGY 1: Prepare squared material (thousands, hundreds, tens, and ones). Display the squared material to show three 4-digit numbers.

e.g.,



Ask a student to write the corresponding number for each representation. Say, "If we write these numbers in increasing order, which number will we write

4.01.01

STRATEGY 1: first? (We will write the least number first.) How can we find the least number using the squared materials? (We can compare the number of thousands, then hundreds, then tens, then ones.) Which number is least? (1,135 is the least.) Which number is greatest?" (2,061 is the greatest.) Ask a student to write the three numbers in increasing order. Ask another student to write the numbers in decreasing order. Say, "Which number will we write first? (The greatest number will be first.) Which will be last? (The least number will be last.) What is the difference between numbers in increasing order and numbers in decreasing order?" (The value of the numbers gets larger in increasing order and smaller in decreasing order.)

Repeat this procedure with other groups of 4-digit numbers. Ask the students to write them in their notebooks in increasing order and then in decreasing order.

STRATEGY 2: Prepare and display a place value chart through the thousands place. Write three 4-digit numbers on the chalkboard next to the place value chart. Ask a student to write each number in the place value chart. e.g.,

	Thousands	Hundreds	Tens	Ones
1,253 =	1	2	5	3
1,135 =	1	1	3	5
2,061 =	2	0	6	1

Say, "Which number is the least? (1,135 is the least.) Which is the greatest? (2,061 is the greatest.) How do you know?" (2,061 is the greatest because it has the greatest number of thousands. 1,135 is the least because, even though it has the same number of thousands as 1,253, it has fewer hundreds.) Ask a student to write the three numbers

4.01.01

STRATEGY 2: in increasing order, from least to greatest on the
cont'd chalkboard. Ask another student to write these
numbers in decreasing order, from greatest to least,
on the chalkboard.

Repeat this procedure using various groups of
numbers.

Say, "What have we been doing with the groups of
numbers? (We have been writing them in increasing
and decreasing order.) Can you think of a rule to
help us order numbers?" (We always compare the
numbers in the highest place value first. If they
are the same, we compare the digits in the next
column to the right.)

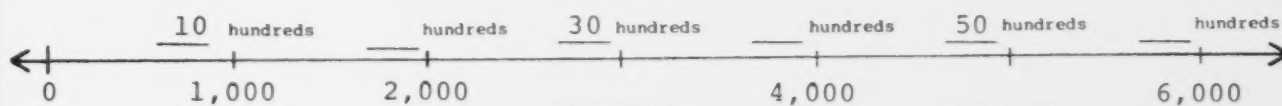
NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Each number has been written one way. Write each number two other ways.

<u>10</u>	hundreds	=	<u>1</u>	thousand	=	<u>1,000</u>
<u>50</u>	hundreds	=	_____	thousands	=	_____
_____	hundreds	=	<u>8</u>	thousands	=	_____
_____	hundreds	=	<u>6</u>	thousands	=	_____
_____	hundreds	=	_____	thousands	=	<u>2,000</u>
<u>70</u>	hundreds	=	_____	thousands	=	_____
<u>30</u>	hundreds	=	_____	thousands	=	_____
_____	hundreds	=	_____	thousands	=	<u>4,000</u>
_____	hundreds	=	<u>9</u>	thousands	=	_____

Write the missing number on the number line.

**CHALLENGE!**

4,500 = _____ hundreds	6,100 = _____ hundreds
6,700 = _____ hundreds	7,800 = _____ hundreds
2,900 = _____ hundreds	9,900 = _____ hundreds

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Circle the greatest number
in each set of three.

825 811 852

7,627 5,422 6,772

2,001 2,101 1,999

Circle the least number
in each set of three.

8,531 7,996 6,249

3,185 2,386 3,211

5,280 5,218 5,281

Write these numbers in increasing order.

4,366, 4,633, 3,998

6,101, 5,998, 6,093

2,383, 1,792, 1,599

3,087, 2,898, 3,024

Write these numbers in decreasing order.

3,857, 2,859, 2,960

1,052, 998, 1,111

2,096, 1,997, 1,059

7,088, 7,998, 8,562

CHALLENGE!

2	6	9	7
---	---	---	---

There are 24 numbers that can be written using all four of these digits. How many can you write? List them in increasing order on a separate piece of paper.

Unit 5

4.12.01 GRAPHS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*4.12.01.01A

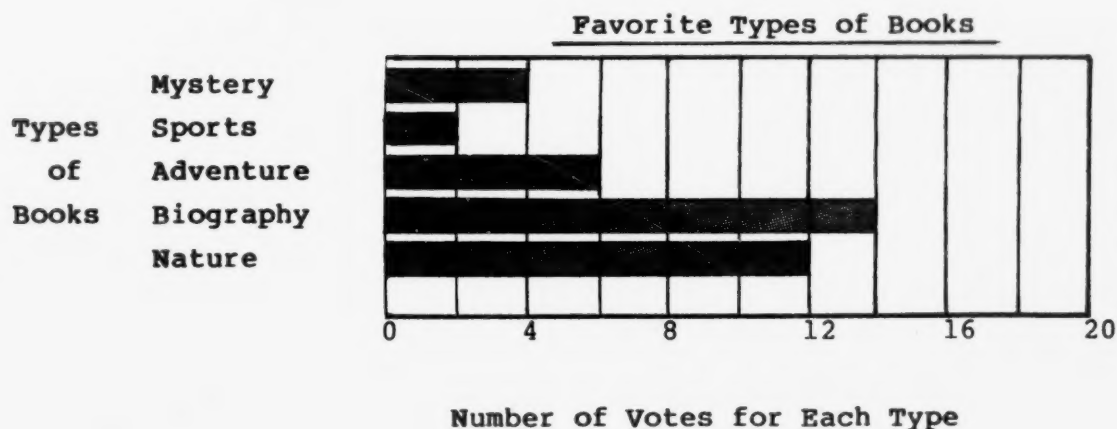
make frequency tables from tallied data;
e.g.,

The frequency with which given letters occur in a poem, a story, or on a page.

Letter	Tally	Frequency
A		4
B		2
C		5

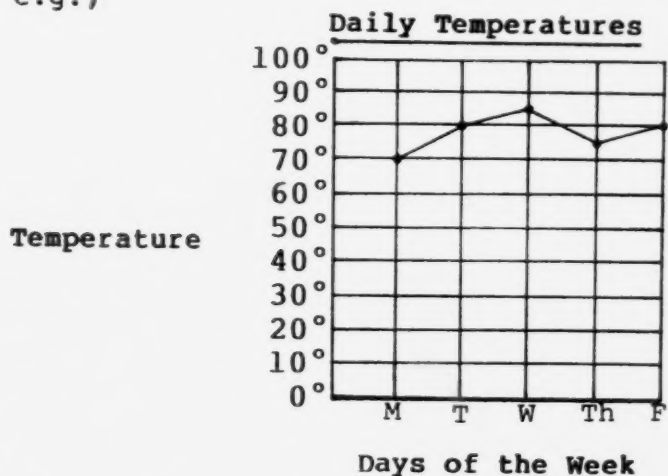
*4.12.01.02A

graph data drawn from newspapers, magazines, polls, and appropriate activities;
e.g.,



4.12.01.03B

read and interpret information from a line graph;
e.g.,



What was the temperature on Monday?

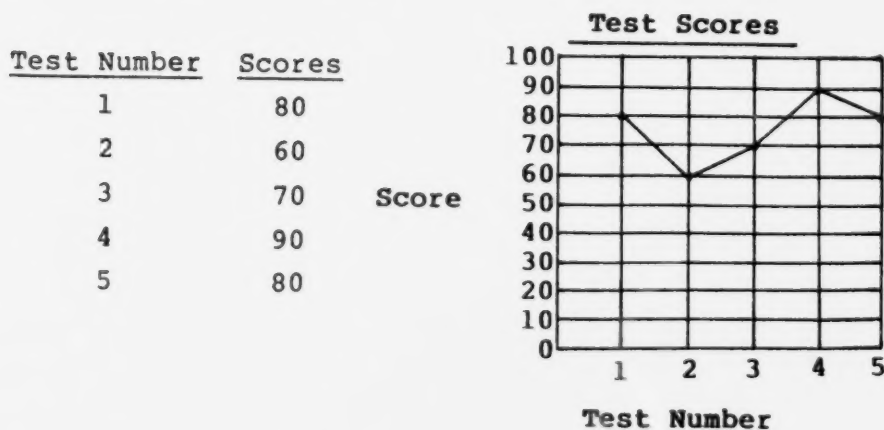
On which two days was the temperature the same?

On which day was the temperature about 85°?

4.12.01.04B

construct a line graph from a table of data.
e.g.,

Use test scores to show intervals to one hundred.



VOCABULARYTERMS

tally
data
line graph
frequency table
graph
chart

SYMBOLS
GETTING STARTED 1:

Prepare and display 10 red interlocking cubes, 5 blue interlocking cubes, and 3 yellow interlocking cubes. Say, "These cubes show the results of a survey of favorite colors chosen by students in an art class. Each student used a color cube to indicate his/her favorite color. What color did most of the students choose? (Most of the students chose red.) What color did the least number of students choose? (The color least chosen was yellow.) How many more students chose blue than yellow? (Two more students chose blue than yellow.) How many students took part in the survey?" (18 students took part in the survey.)

Say, "The information that we have collected is called data. We can show this data many ways besides using the interlocking cubes." Show a chart on chalkboard.

e.g.,

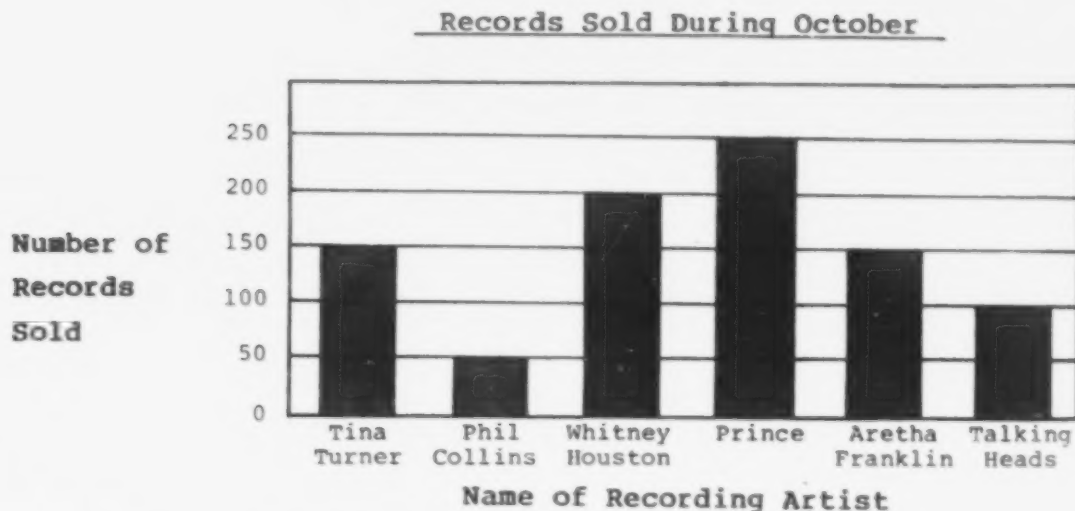
Color	Choices of Students
red	
blue	
yellow	

Say, "A tally is another way to display data. Can you think of other ways to show data?" (We can make a bar graph, a picture graph, ...)

4.12.01

GETTING STARTED 2:

Prepare and display the following graph on chart paper:



Say, "What does this graph show? (This graph shows how many records were sold by 6 recording artists during October.) What does the horizontal axis show? (The horizontal axis lists the names of the recording artists.) What does the vertical axis show? (The vertical axis shows the number of records sold.) What do we call this kind of graph? (We call this a bar graph.) Why would we use a graph to show this information? (Accept all reasonable responses.) Which artist sold the most recordings during the month of October?" (Prince sold the most recordings during October.)

4.12.01

4.12.01.01 make frequency tables from tallied data

STRATEGY 1: Prepare and display a blank chart on the chalkboard. Say, "Let's write a story about our trip to the zoo. As you tell the story, I will write it on the chart." e.g.,

On May 14th our class went to the Bronx Zoo. We got on the bus at 9:30 A.M. On the bus, we told stories and sang songs. At the zoo, we saw some bears, monkeys, and tigers. The zookeeper showed us how he feeds the animals. We went home at 2 P.M.

Ask several students to read the story aloud. Say, "The vowels are a, e, i, o, u. I wonder how many times each vowel appears in our story. Which one do you think will appear most often. How can we find out?" (We can count the vowels and tally the number of times each vowel appears.)

Prepare a chart on the chalkboard. List the vowels in the first column. Ask a student to count each time the letter "a" appears in the story while another student keeps the tally on the chart. e.g.,

Vowel	Tally	Frequency
a		
e		
i		
o		
u		

Say, "How many times did the letter 'a' appear? (The letter 'a' appeared 13 times.) We call that number the frequency of the letter 'a'." Write 13 in the column labeled frequency.

4.12.01

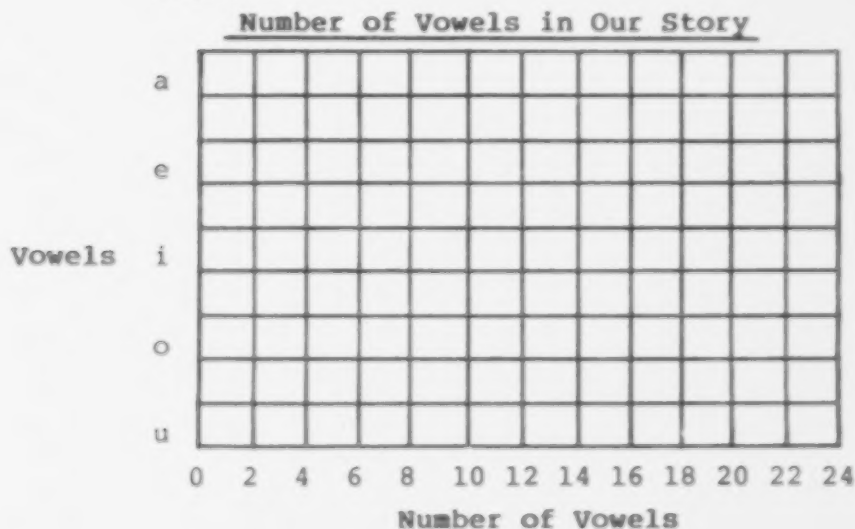
STRATEGY 1: Repeat this procedure for each of the remaining vowels. Say, "We have made a frequency table from the data we gathered. Which vowel appeared most often in our story? (The vowel 'e' appeared most often.) How many times did 'a' appear? ... 'i' appear? How many vowels were in our story? Why is a frequency table helpful when we are gathering data?" (Frequency tables make it easy to compare data.)

4.12.01.02 graph data drawn from newspapers, magazines, polls, and other appropriate activities

STRATEGY 1: Prepare one-inch graph paper. Display the frequency table created in Strategy 1, P.O. 4.12.01.01.

Say, "We can show this data on a graph." Draw horizontal and vertical axes on the one-inch graph paper. Say, "What information should we put on the horizontal axis? (The numbers that represent how many times each vowel appeared belong on the horizontal axis.) What information should we put on the vertical axis?" (We should list the vowels a, e, i, o, and u.)

e.g.,

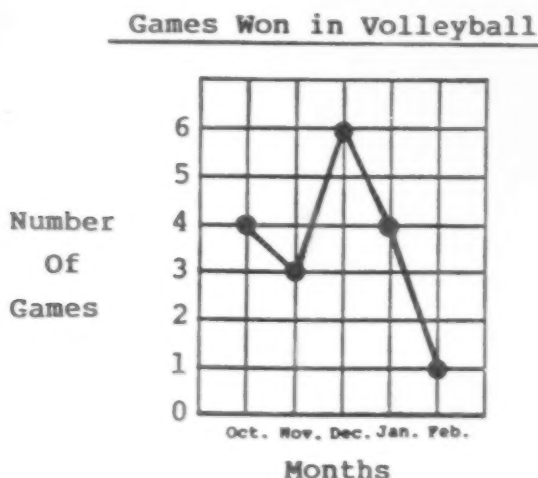


4.12.01

STRATEGY 1: Ask students to use the tally to complete the bar graph.
cont'd
Say, "Which is easier to read, a tally chart or a bar graph? Why?"

4.12.01.03 read and interpret information from a line graph

STRATEGY 1: Duplicate a line graph showing volleyball games won by fourth graders and distribute to the students.
e.g.,



Say, "This is a special kind of graph called a line graph. The names of the months along the horizontal axis tell when the games were played. The numbers along the vertical axis tell how many games were won." Ask a student to locate November. Say, "Place your finger on the line above November and move up the line to the point. Now, look to the vertical axis and find the number that corresponds to that point. What is that number? (The point is along the line with the 3.) What does that tell us?" (That tells us that the fourth grade won 3 games in November.) Repeat this procedure for the other 4 months. Explain that line segments are used to connect the points in order.

4.12.01

STRATEGY 1:
cont'd

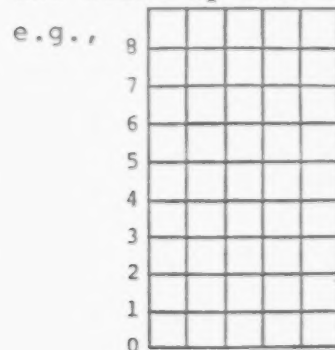
Say, "When were the most games won? (The most games were won in December). How many games were won in December? (Six games were won in December.) What happened to the team from December to January? (They won fewer games.) How many games were won during the five months? (The fourth graders won 18 games in all.) How did you find that out? (We added the number of games won each month.) Why do you think this type of graph is called a line graph? (It is called a line graph because lines are used to connect the points on the graphs.) How is a line graph different from a bar graph? How are they the same?" (Accept any reasonable answers.)

4.12.01.04 construct a line graph from a table of data

STRATEGY 1: Prepare graph paper for each student or pair of students. Say, "Stanley is keeping a record of the number of books he reads. He made the following chart:

October - 4 books
November - 6 books
December - 3 books
January - 8 books

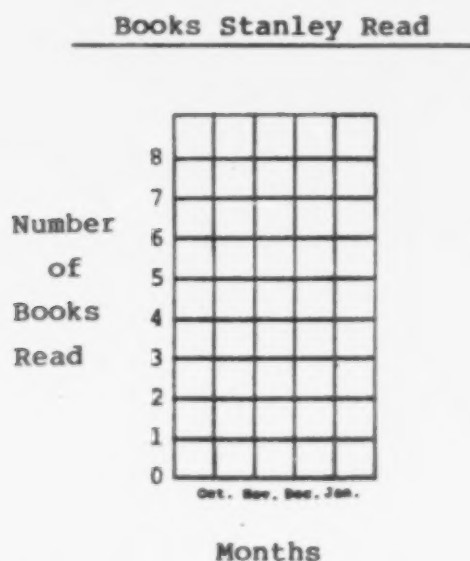
Say, "Let's enter this data on a line graph." Distribute the graph paper and say, "We are going to list the months along the bottom, or horizontal axis, and the number of books read along the left edge, or vertical axis, of the graph paper. Start with zero and count by ones from there."



4.12.01

STRATEGY 1: cont'd

Say, "How will a person reading this graph know what the graph is about and what the numbers represent? (We must give our graph a title and we must label each axis.) What title should we give this graph? (The title can be Books Stanley Read.) What shall we label each axis?" (Accept any reasonable responses.) Write the title and the axis labels on the chalkboard for students to write on their graphs. Say, "How many books did Stanley read in October? (He read 4 books in October.) Place your finger on the line that says October and move up. Keep looking at the numbers to the left until you see the 4. Stop, and place a point at that spot." Demonstrate.
e.g.,

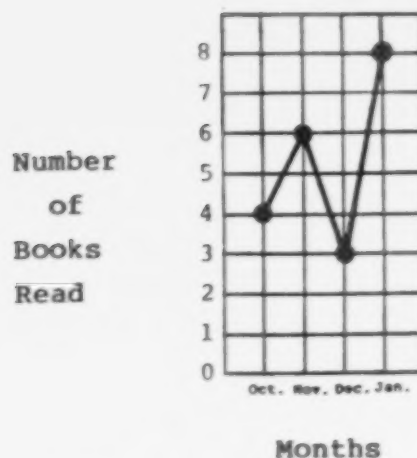


Repeat this procedure for November, December, and January. Say, "Connect the points between October and November with a line segment." Repeat this procedure by connecting the point for November to the point for December and the point for December to the point for January.

4.12.01

STRATEGY 1: e.g.,
cont'd

Books Stanley Read



Say, "Why do we call this a line graph? (We call this a line graph because we used line segments to connects the points indicating the data.) In which month did Stanley read the most books? (He read the most books in January.) ... fewest books? (... fewest books in December.) How many more books did he read in January than in October?" (He read four more books in January than in October)?

STRATEGY 2: Adapt the data from the graph used in Getting Started 2 and use it to construct a line graph to represent that data.

P.O. _____

NAME: _____

CLASS: _____

DATE: _____

- (1) Indicate the frequency next to each tally.

<u>Tally</u>	<u>Frequency</u>	<u>Tally</u>	<u>Frequency</u>
///	_____	/// ///	_____
///	_____	/// /// ///	_____
/// ///	_____	/// /// ///	_____

- (2) Fill in the missing items for each table of data.

Times We Played Ball	Tally	Frequency
March	////	
April	/// ///	
May		10

Times It Snowed	Tally	Frequency
December		4
January		6
February	/// ///	

- (3) It rained 3 days in October, 7 days in November, and 11 days in December. Use this table for tallying the number of days it rained each month. Then write the frequency for each month.

Rainy Days	Tally	Frequency
October		
November		
December		

CHALLENGE!

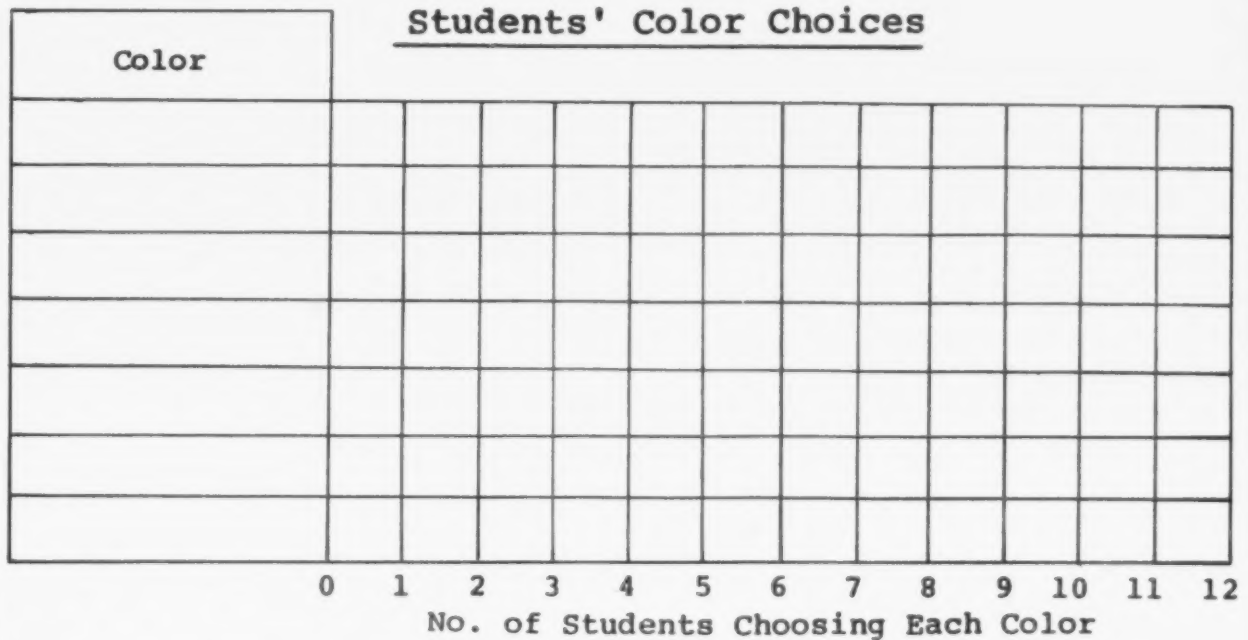
Which vowel do you think is used most frequently?

Select a paragraph from one of your textbooks or from the newspaper. Make a frequency table to record this information. Then make a bar graph to show your findings. If you can, make a horizontal and a vertical bar graph.

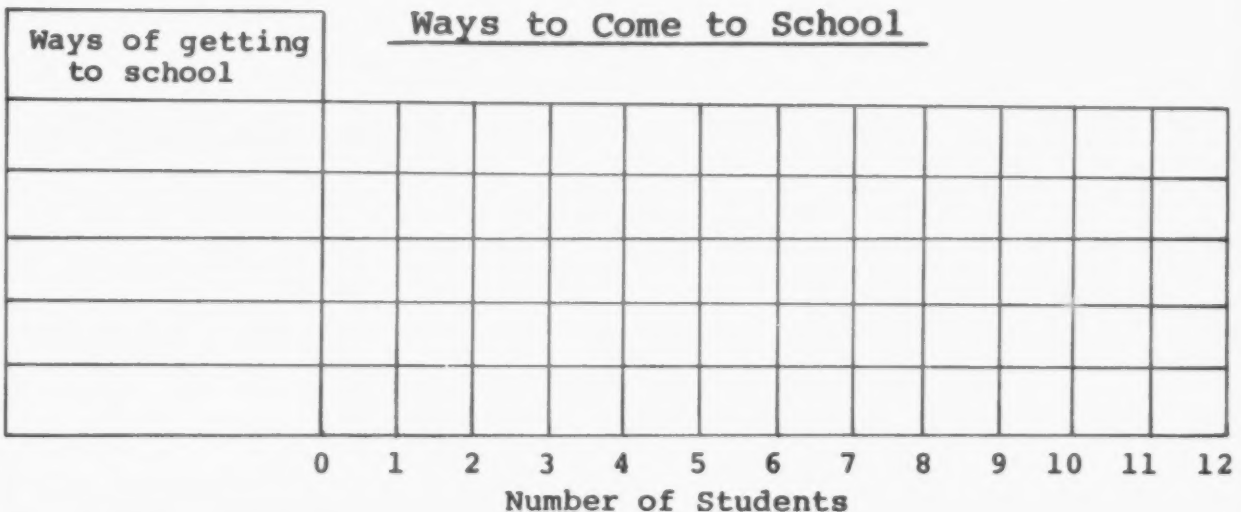
NAME: _____ CLASS: _____ DATE: _____

Complete each bar graph using the information given.

For an art project, 5 students chose red paper, 7 chose blue, 3 chose yellow, and 8 chose green. Show the number of students who chose each color.



A poll of class 4-204 showed that 12 students walked to school, 9 rode the school bus, and 7 came by car. Show the number of students who came to school each way.



NAME: _____ CLASS: _____ DATE: _____

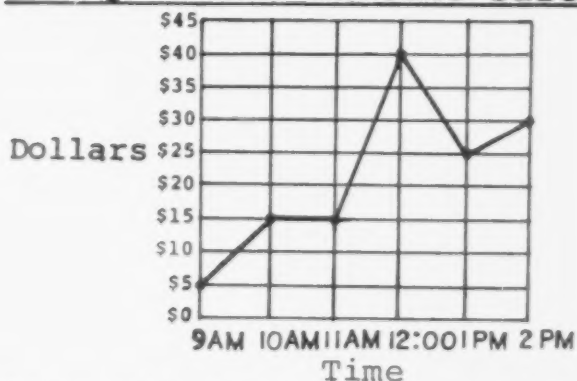
Use the line graphs to answer the questions.

Games Won in Gym

- (a) How many games were won in October? _____
- (b) In what months did we win the same number of games?

- (c) In what months did we win the least amount of games?

- (d) When did we win the most games? _____
- (e) How many games did we win in all? _____

Money Earned in Cake Sale

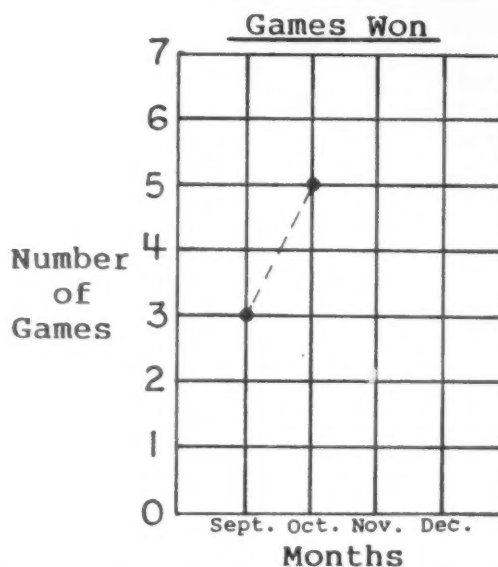
- (a) When did we sell the least amount of cake? _____
- (b) When did we sell the most? _____
- (c) Between which times was there the greatest increase in sales?

- (d) Between what times did sales decrease? _____

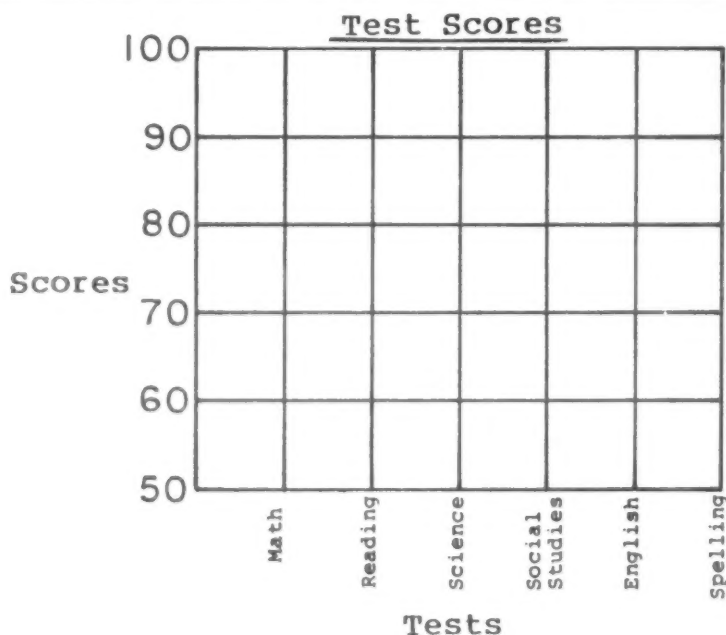
NAME: _____ CLASS: _____ DATE: _____

Construct a line graph for each table of data.

<u>Month</u>	<u>Games Won</u>
Sept.	3
Oct.	5
Nov.	2
Dec.	6



<u>Test</u>	<u>Score</u>
Math	60
Reading	80
Science	90
Social Studies	70
English	100
Spelling	80

**Do you remember?**

Mary has a snack when she comes home from school. She has a piece of fruit and a drink. She can choose from an apple, a banana, an orange, milk, and juice. How many different arrangements can Mary make? Write a list or make a diagram on a separate piece of paper to show these arrangements.

_____ arrangements

4.13.01 PROBLEM SOLVING: USE TABLES**AND GRAPHS TO LOCATE INFORMATION**

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.13.01.01A

locate information on a table/chart and solve problems using this information;

e.g.,

New York City Bridges		
Name	Bridge Length	Year Completed
Brooklyn	486 m	1883
Manhattan	448 m	1909
Verrazano	1298 m	1964

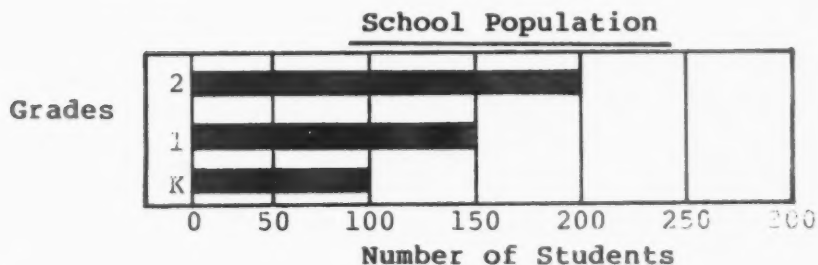
How many years older is the Manhattan Bridge than the Verrazano Bridge?

Which bridge is 812 meters shorter than the Verrazano Bridge?

4.13.01.02A

locate information on a graph and solve problems using this information.

e.g.,



Which grade has 50 fewer students than Grade 2?

How many students are in all the grades?

80

VOCABULARYTERMS

data
graph
chart
table

GETTING STARTED 1:

Prepare and distribute several local newspapers to groups of students or a duplicated copy of a newspaper's daily weather report to each student. Draw the following chart on the chalkboard.

e.g.,

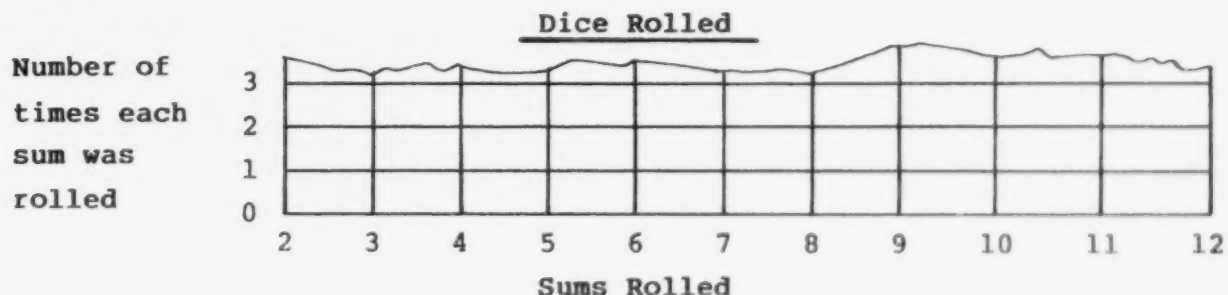
<u>Yesterday's Weather for Major U.S. Cities</u>		
City	High Temperature	Low Temperature
1.		
2.		
3.		
4.		
5.		

Ask the students to locate the table labeled Temperature of U.S. Cities in the newspaper. Say, "What information does this table provide? (It shows yesterday's high and low temperatures for many large cities in the United States.) We are going to make a weather chart showing some of the information in this table. Every table and chart needs a title which tells the main idea." Ask a student to read the title of the chart on the chalkboard. Ask another student to write New York City next to the number 1 in the first column. Say, "What was yesterday's high temperature in New York City?" Ask a student to write in that temperature in the second column. Continue this procedure for New York City's low temperature. Ask a student to read all the information listed for New York City on this chart. Choose other cities to complete the chart. Repeat this procedure for each city listed.

GETTING STARTED 2:

Prepare a pair of dice. Say, "Everyone will get one turn to roll the dice. You will tell the sum of the numbers facing up when the dice land. We will make a frequency table and a line graph to show the number of times each sum was rolled. How must we prepare this graph? (We must have a title and label the horizontal and vertical axes.) What would be an appropriate title? How shall we label each axis? (Accept all reasonable responses.) What sums can possibly be rolled using these dice?" (The sums 2 through 12 can be rolled.) Prepare the graph at the chalkboard.

e.g.,



As each student rolls the dice and graphs his/her results, ask the students to tell the sum of the numbers rolled and how many times that sum has now been rolled.

4.13.01

4.13.01.01 locate information on a table/chart and solve problems using this information

STRATEGY 1: Display the temperature table constructed in Getting Started 1. Say, "We can see trends in temperature and climate. If someone is traveling to another area, he/she wants to be prepared for the type of weather that city is having. Which city had the highest temperature? (Miami had the highest temperature.) ... the lowest temperature? (Juneau had the lowest temperature.) How much higher was the temperature in Miami than in New York? Which city (ies) had a temperature 15° cooler than New York? In which cities could you have gone swimming? How do you know?"

After the students have solved several problems using the table, ask them to create their own problems for their classmates to solve. Allow time for sharing these problems.

Say, "How did we use this table to solve problems? (We used the table to compare information.) What other uses might this table have?" (Accept all reasonable answers.)

STRATEGY 2: Prepare and distribute paper to each student or group of students to construct a school workers' chart. Say, "Many people work in a school building. Who are these people?" (They are the Principal, Ass't. Principal(s), teachers, secretaries, paraprofessionals, aides, custodian, cafeteria staff and security guards.) List these workers in a column and then say, "What shall we call this column? (We will call this column Types of Workers.) How many of each type of worker works in this school? (Write the number next to each type.) What shall we call this column? (We will call this column Number of Workers.)

4.13.01

STRATEGY 2: What time does each of these workers begin and end his/her day?" List the times in the third column. Say, "What shall we label that column?" (We will label it Time Worked.) Label each column after eliciting the title.
e.g.,

School Workers		
Type of Worker	Number of Workers	Time Worked
Principal	1	8:00 A.M. - 4:00 P.M.
Ass't Principal(s)	1	8:30 A.M. - 3:30 P.M.
Teachers	25	8:40 A.M. - 3:00 P.M.

Say, "Which is the largest group of workers in our school? How do you know? (Teachers are the largest group because there are 25 teachers.) Which type of worker works the longest day? How do you know?" (Accept appropriate responses. Answers may vary according to the information gathered.) Continue asking comparison questions about this table. Say, "Why do you think we listed our information in a table? (A table provides a way to organize information clearly.) What other uses might this table have?" (Accept all reasonable responses.)

4.13.01.02 locate information on a graph and solve problems using this information

STRATEGY 1: Display the Dice Rolled graph constructed in Getting Started 2. Say, "Why did we record our dice sums on a graph? (A graph helps us see data and make comparisons quickly.) What information does this graph show? (This graph shows how many times each sum was thrown and the number of times the dice was thrown.) Which sum appeared more often than the others? How do you know? (___ was thrown most often

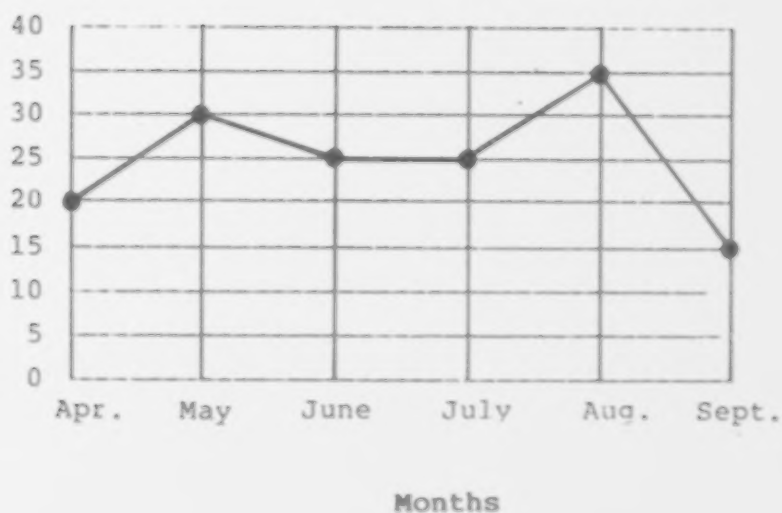
4.13.01

STRATEGY 1: because it has the highest bar on the graph.) How many times were 7 and 8 rolled together?" Ask other questions pertaining to this graph. Allow the students to make up questions about this graph to ask other students.

STRATEGY 2: Adapt Strategy 1, P.O. 4.13.01.02, for use with the following graph:

Hours of Practice
for the School Soccer Team

Number
of Hours



NAME: _____ CLASS: _____ DATE: _____

Use the chart to solve each problem.

COST TO OPERATE HOME APPLIANCES	
APPLIANCES	COST PER MONTH
Clock	\$.08
Oven	4.95
Refrigerator	8.18
Water Heater	12.60
Color Television	2.15
Washing Machine	.45
Lights	5.85

1. How much will it cost to run a refrigerator for one month?

2. What is the cost of operating a water heater, lights, and a refrigerator for one month?

3. How much more does it cost to run a color television than a washing machine for one month?

4. How much more does it cost to use a refrigerator for two months than an oven for two months?

5. How much cheaper is it to run a refrigerator than a water heater for one month?

6. What will be the monthly cost for operating each appliance above for 1 month?

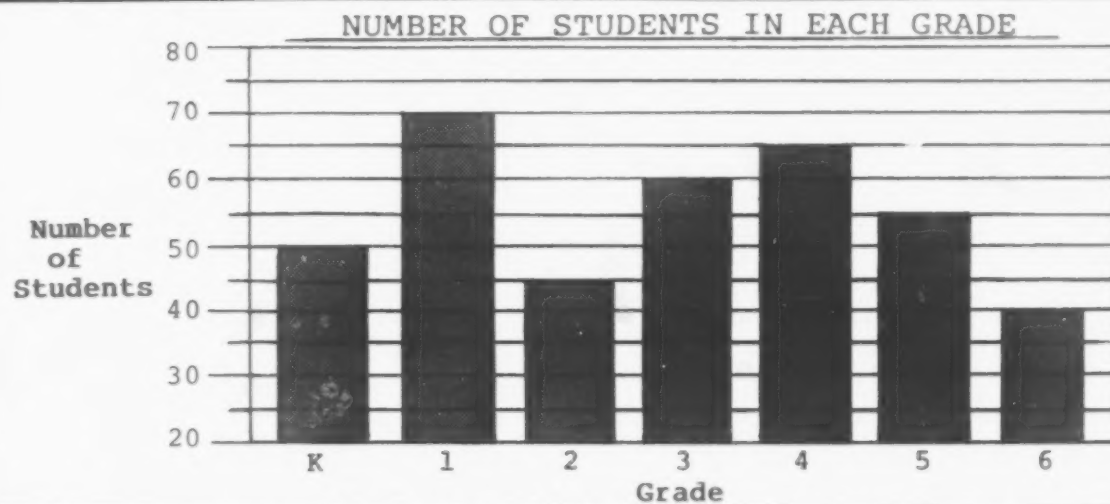
Do you remember?

Write the following numerals in increasing order.
5,463, 5,629, 5,099, 5,180

86

NAME: _____ CLASS: _____ DATE: _____

Use the graph to help you solve each problem.



1. How many more students are in grade 1 than in grade 2?

2. How many students are in the fifth and sixth grades?

3. Which two grades have a total of 130 students?

4. How many more students are in grade 4 than in grade 6?

5. How many fewer students are in grade 2 than in Kindergarten?

6. How many students are in the entire school?

CHALLENGE!

Which 3 grades have a combined total of exactly 175 students?

87

SHARPENING YOUR SKILLS

Units 4, 5, 6

Name: _____ Class: _____ Date: _____

1. 30 hundreds = thousand

30 3 300 Not Here
(a) (b) (c) (d)

2. 5 thousand = hundreds

50 500 6 Not Here
(e) (f) (g) (h)

3. Write the following numbers in increasing order.

6,264 6,029 6,150

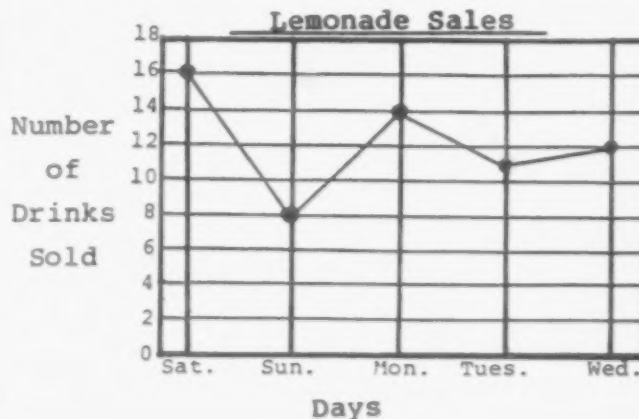
4. Write the following numbers in decreasing order.

4,988 4,975 5,132

5. Maria counted the number of pennies, nickels, and dimes in her bank. Complete the frequency table below to find out how many of each coin Maria had.

Coin	Tally	Frequency
penny		
nickel		
dime		

Chris and Bobby set up a lemonade stand. They made a graph to show the number of drinks sold each day. Use the graph to answer questions 6 and 7.



6. On which day were the most drinks sold? _____

7. How many drinks were sold during the five days? _____

Use the table below to answer questions 8 and 9.

Number of Students in 4th Grade

Class	Boys	Girls
4A	14	18
4B	16	15
4C	12	17

8. Which class has the greatest number of students? _____

9. Which class has 3 more girls than class 4B? _____

6-DIGIT NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

- *4.01.02.01A use a place value chart to interpret 5- and 6-digit numbers;
e.g.,

Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
	8	0	4	3	7
4	3	2	5	0	6

- *4.01.02.02A identify and write 5- and 6-digit numbers in expanded notation;
e.g.,

$$23,465 = 20,000 + 3,000 + 400 + 60 + 5$$

$$871,362 = 800,000 + 70,000 + 1,000 + 300 + 60 + 2$$

- 4.01.02.03A identify and write 5- and 6-digit numbers in standard form given their expanded notation.
e.g.,

$$20,000 + 3,000 + 400 + 60 + 5 = 23,465$$

$$800,000 + 70,000 + 1,000 + 300 + 60 + 2 = 871,362$$

VOCABULARYTERMS

expanded notation
 standard form
 ten thousands
 hundred thousands

GETTING STARTED 1:

Prepare nine large numeral cards labeled 1 through 9 and a lined piece of paper for each student. Display the numeral cards and distribute the lined paper. Demonstrate as you say, "Fold your paper into five columns lengthwise, making the left-most column very narrow. This is a place value chart. Each column represents a place value. What does the furthest column to the right represent? (This column represents the ones.) At the top of this column write ones. What value does the next column to the left represent? (This column represents the tens.) At the top of that column write tens." Continue this procedure for labeling the hundreds and the thousands columns.

Demonstrate as you say, "Write the letters A through E in the narrow left column. Skip a line after each letter."

e.g.,

	thousands	hundreds	tens	ones
A.				
B.				
C.				
D.				
E.				

Ask a student to choose a numeral card. Say, "Write this digit in row A in whichever column you choose." Continue this procedure with three other cards. Say, "What number have you written?" (Answers will vary.) Record the students' numbers on the chalkboard as they are read. Say, "How did you know how to read the number you had written?" (I began reading at the left and read each digit with its value.)

4.01.02

GETTING STARTED 1: cont'd

Repeat this until each student has had a chance to read his/her number.

GETTING STARTED 2:

Prepare lined paper for each student. Draw a place value chart through thousands place on the chalkboard. Say, "Number your paper from 1 through 10. When you are called, say a number from 0 through 9. Then write that number in one of the columns on the chalkboard." Ask four students to each write a number on the chart.

e.g.,

thousands	hundreds	tens	ones
4	2	3	6

Say, "What number was written? (The number is four thousand two hundred thirty-six.) Next to the number 1 on your paper write 4,236. What is the value of the 4 in 4,236? (The value of the 4 is 4,000.) Next to 4,236 write = 4,000. What is the value of the 2 in 4,236? (The value of the 2 is 200.) Write + 200. What is the value of the 3 in 4,236? (The value of the 3 is 30.) Write + 30. What is the value of the 6 in 4,236? (The value of the 6 is 6 ones.) Write + 6."

e.g.,

thousands	hundreds	tens	ones	
4	2	3	6	= 4,000 + 200 + 30 + 6

Say, "What is the value of 4,236? (4,236 means 4000 + 200 + 30 + 6.) This way of writing a number is called expanded notation. How did we find and write the expanded notation?" (We wrote the value of each digit in the number.) Continue this procedure with other 4-digit numbers.

4.01.02

4.01.02.01 use a place value chart to interpret 5- and 6-digit numbers

STRATEGY 1: Prepare and distribute lined paper to each student. Demonstrate as you say, "Fold your paper into six columns. We are going to make a place value chart. How is a place value chart useful? (A place value chart shows us the value of each digit in a number.) What value would the digit in the column furthest to our right represent? (The value of this digit would be ones.) What value would the digit in the second column from the right represent? ... third column from the right? (The value of this digit would be tens ... hundreds.) How many ones equal 1 ten? (10 ones equal 1 ten.) ... tens equal one hundred? 10 tens equal 1 hundred.) These three columns show the Units Period." Draw a chart on the chalkboard for the students to copy on their paper.

e.g.,

Units Period		
hundreds	tens	ones

Extend the place value chart to include the thousands place. Darken the line drawn between the hundreds column and the thousands column. Say, "Why did I darken the line between the hundreds column and the thousands column? (The dark line between the hundreds place and the thousands place represents the comma we would write between these digits.) How do we know the value of each column as we move left on the place value chart? (As we move left, each place is ten times greater than the place to its right.) What will be the name of the column to the left of the thousands place? (It will be the ten thousands

4.01.02

STRATEGY 1: place.) How do you know?" (Ten thousand is ten times greater than one thousand.) Repeat this procedure to name the hundred thousands place. Say, "How many hundreds equal 1 thousand? ... thousands equal ten thousand? ... ten thousands equal 1 hundred thousands?" (10 hundreds equal 1 thousand, 10 thousands equal 1 ten thousand, and 10 ten thousands equal 1 hundred thousand.) These three columns show the Thousands Period." Complete the chart for the students to copy.

e.g.,

Thousands Period			Units Period		
hundred thousands	ten thousands	thousands	hundreds	tens	ones

Write a digit in each column, e.g., 192,654. Ask the students to read the number. Say, "What is the value of the 2 in this number?" (The value of the 2 is 2 thousand.) Continue this questioning for each digit in the number 192,654. Say, "Write a 5-digit number on your chart." Ask several students to read the number they have written and write it in the place value chart on the chalkboard. Repeat this procedure with other 6-digit numbers.

4.01.02.02 identify and write 5- and 6-digit numbers in expanded notation

STRATEGY 1: Draw a place value chart through ten thousands on the chalkboard. Write a 5-digit number on the chart.

e.g.,

ten thousands	thousands	hundreds	tens	ones
3	7	1	0	4
		93		

4.01.02

STRATEGY 1: Ask the students to draw and label this chart in their notebook. Ask a student to read the number aloud. Say, "What is the value of each digit in this number?" (The value of the 3 is 30 thousand. ... 7 is 7 thousand. ... 1 is 1 hundred. ... 0 is 0 tens. ... 4 is 4 ones.) On the chalkboard write $37,104 = 30,000 + 7,000 + 100 + 4$. Say, "How is this number written?" (It is written in expanded notation.) Ask a student to read the expanded notation aloud. Say, "Why wasn't the zero included in the expanded notation?" (The zero is a place holder and will not change the value of the expanded notation if it is not included.)

Extend the place value chart to 6 places and repeat the above procedure.

Say, "How can we identify 5- and 6-digit numbers in expanded notation?" (We can draw a place value chart to help us identify the value of each digit.) Write several 5- and 6-digit numbers on the chalkboard. Ask the students to read these numbers and then write them in the place value chart and also in expanded notation.

STRATEGY 2: Adapt Getting Started 2 for use with 5- and 6-digit numbers.

4.01.02.03 identify and write 5- and 6-digit numbers in standard form given their expanded notation

STRATEGY 1: Write a 5-digit number in expanded notation on the chalkboard.

e.g.,

$$40,000 + 8,000 + 900 + 10 + 6$$

4.01.02

STRATEGY 1: Draw a place value chart on the chalkboard. Elicit the value of each column and label it.

e.g.,

ten thousands	thousands	hundreds	tens	ones
------------------	-----------	----------	------	------

Point to the expanded numeral and say, "How is this numeral written? (It is written in expanded notation.) We want to write this number in standard form. What can we do to make this task easier? (We can write each digit in its correct place in the place value chart.) Which column would show 40,000? (The ten thousands column would show 40,000.) What numeral should we write in the ten thousands column?" (We should write the numeral 4 in the ten thousands column.) Continue writing each digit in a column until the number is complete.

e.g.,

ten thousands	thousands	hundreds	tens	ones
4	8	9	1	6

Say, "What standard number does this expanded notation show?" (The standard number is 48,916.) Ask a student to write the standard form of the number next to its expanded form. Repeat this procedure with other 5-digit numbers. Extend the place value chart to hundred thousands place to continue this procedure with 6-digit numbers.

STRATEGY 2: Prepare and display cards labeled 100,000 through 900,000 by hundred thousands, 10,000 through 90,000 by ten thousands, 1,000 through 9,000 by thousands, 100 through 900 by hundreds, 10 through 90 by tens

4.01.02

STRATEGY 2: and 1 through 9. Place each set in a separate pile.
 cont'd Ask a student to draw one card from each pile.
 Display the selected cards on the chalk ledge in decreasing order with a plus symbol between each pair of cards.

e.g.,

$$100,000 + 20,000 + 3,000 + 400 + 50 + 6$$

Say, "What do we call this 'stretched out' form of a number? (This form is called expanded notation.) What can we do to help us read this number?" (We could add the numbers together in columns.) Ask a student to perform the addition on the chalkboard and read the standard form.

e.g.,

$$\begin{array}{r} 100,000 \\ 20,000 \\ 3,000 \\ 400 \\ 50 \\ 6 \\ \hline 123,456 \end{array}$$

Repeat this procedure with other 5- and 6-digit numbers. Periodically, eliminate a selection from one or more piles of cards so a zero will appear in one or more places in the standard form.

e.g.,

$$\boxed{400,000} + \boxed{3,000} + \boxed{600} + \boxed{50} + \boxed{8}$$

$$\begin{array}{r} 400,000 \\ 3,000 \\ 600 \\ 50 \\ + 8 \\ \hline 403,658 \end{array}$$

Say, "What happened to the standard form of the number when we did not choose a card from the ten thousands pile?" (We had a zero in the ten thousands place in the standard form of the number.)

NAME: _____ CLASS: _____ DATE: _____

Write each number below in the place value chart. Then use the place value chart to help you complete each sentence.

	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones	
36,415		3	6	4	1	5	The 4 in 36,415 has a value of _____. The 6 in 36,415 has a value of _____.
45,308							The 8 in 45,308 has a value of _____. The 4 in 45,308 has a value of _____.
27,569							The 2 in 27,569 has a value of _____. The 6 in 27,569 has a value of _____.
612,900							The 1 in 612,900 has a value of _____. The 2 in 612,900 has a value of _____.
256,013							The 2 in 256,013 has a value of _____. The 3 in 256,013 has a value of _____.
703,654							The 6 in 703,654 has a value of _____. The 7 in 703,654 has a value of _____.

CHALLENGE!

Look at the following numbers.

125,627

52,158

341,256

Circle the number in which the 5 has the greatest value. Write its value. _____

NAME: _____

CLASS: _____

DATE: _____

Write each number in expanded notation.

$$34,781 = \underline{3} \text{ ten thousands} + \underline{4} \text{ thousands} + \underline{7} \text{ hundreds} + \underline{8} \text{ tens} + \underline{1} \text{ one.}$$

$$512,348 = \underline{\quad} \text{ hundred thousands} + \underline{\quad} \text{ ten thousand} + \underline{\quad} \text{ thousands} + \underline{\quad} \text{ hundreds} + \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones.}$$

$$679,542 = \underline{\quad} \text{ hundred thousands} + \underline{\quad} \text{ ten thousands} + \underline{\quad} \text{ thousands} + \underline{\quad} \text{ hundreds} + \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones.}$$

$$89,012 = \underline{\quad} \text{ ten thousands} + \underline{\quad} \text{ thousands} + \underline{\quad} \text{ hundreds} + \underline{\quad} \text{ ten} + \underline{\quad} \text{ ones.}$$

$$80,437 = \underline{\quad} \text{ ten thousands} + \underline{\quad} \text{ thousands} + \underline{\quad} \text{ hundreds} + \underline{\quad} \text{ tens} + \underline{\quad} \text{ ones.}$$

$$234,781 = \underline{200,000} + \underline{\quad} + \underline{\quad} + \underline{700} + \underline{\quad} + \underline{\quad}.$$

$$347,182 = \underline{300,000} + \underline{\quad} + \underline{7,000} + \underline{\quad} + \underline{\quad} + \underline{\quad}.$$

$$548,963 = \underline{\quad} + \underline{40,000} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad}.$$

$$88,421 = \underline{\quad} + \underline{8,000} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad}.$$

NAME: _____

CLASS: _____

DATE: _____

Write each expanded number in standard form.

7 hundred thousands + 6 ten thousands + 2 thousands + 4 hundreds
+ 2 tens + 1 one = 762,421.

8 hundred thousands + 5 ten thousands + 1 thousand + 3 hundreds +
8 tens + 9 ones = _____.

2 ten thousands + 9 thousands + 8 hundreds + 6 tens = _____.

3 ten thousands + 2 thousands + 1 hundred + 2 tens + 4 ones = _____.

1 ten thousand + 5 hundreds + 8 tens + 7 ones = _____.

20,000 + 7,000 + 700 + 60 + 4 = _____.

10,000 + 6,000 + 900 + 80 + 1 = _____.

100,000 + 30,000 + 5,000 + 200 + 70 + 5 = _____.

200,000 + 40,000 + 3,000 + 70 + 5 = _____.

500,000 + 1,000 + 200 + 30 + 6 = _____.

4.01.03 ROUND 4- AND 5-DIGIT NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.01.03.01A round 4- and 5-digit numbers to the nearest
thousand;
e.g.,

5,836 is between 5,000 and 6,000.
With an 8 in the hundreds place,
5,836 to the nearest thousand is 6,000.

15,456 is between 15,000 and 16,000.
With a 4 in the hundreds place,
15,456 to the nearest thousand is 15,000.

4.01.03.02A round 4- and 5-digit numbers to the nearest
hundred.
e.g.,

5,645 is between 5,600 and 5,700.
With a 4 in the tens place,
5,645 to the nearest hundred is 5,600.

16,750 is between 16,700 and 16,800.
With a 5 in the tens place,
16,750 to the nearest hundred is 16,800.

VOCABULARY

rounding

Prepare fifteen cards with a different thousands number on each.

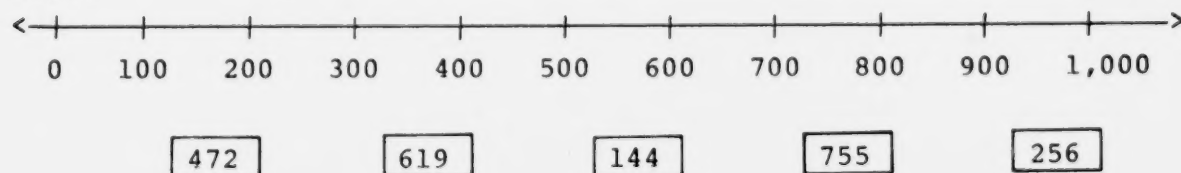
7,000 9,000 15,000 21,000

Display a card on the chalkboard, e.g., 9,000. After a student names the thousand before 9,000 and the thousand after 9,000, ask another student to write those numbers on the chalkboard.

8,000	9,000	10,000
-------	-------	--------

GETTING STARTED 2:

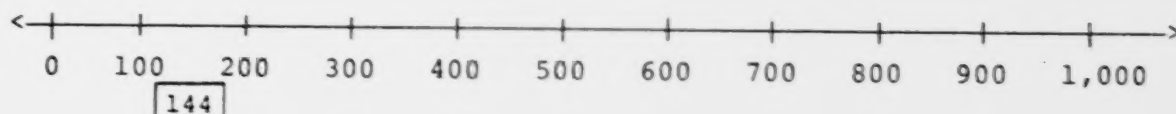
e.g.,



GETTING STARTED 2: cont'd

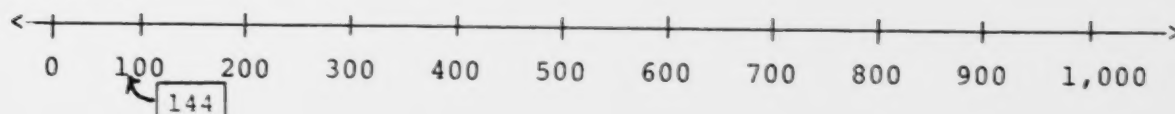
Display a card, e.g., 144. Say, "What must we do first in order to round 144 to the nearest hundred? (To round 144 to the nearest hundred we must decide between which pair of hundreds it is.) Between which pair of hundreds does this number come?" (144 is between 100 and 200.) Place the card between 100 and 200 on the number line.

e.g.,



Say, "How can we decide to which hundred we should round this number? (We look at the tens digit. If it is less than 5, we round to the lower hundred. If it is 5 or more, we round to the higher hundred.) What is the tens digit in this number? (The tens digit is 4.) To which hundred will we round 144?" (144 rounded to the nearest hundred is 100.) Draw an arrow from the card to the rounded hundred.

e.g.,



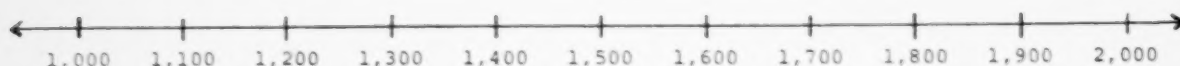
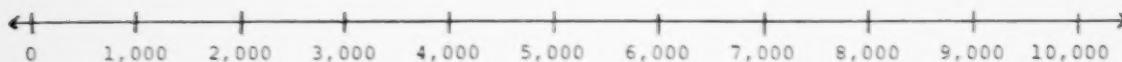
Repeat this procedure with the remaining 3-digit number cards.

4.01.03

4.01.03.01 round 4- and 5-digit numbers to the nearest thousand

STRATEGY 1: Prepare and display two number lines, one counting by thousands through ten thousand and one counting by hundreds between a pair of thousands.

e.g.,



Say, "These number lines will help us learn to round numbers to the nearest thousand. To round a number to the nearest thousand, we must first decide between which pair of thousands it comes." Write a 4-digit number on the chalkboard, e.g., 1,347. Say, "Look at the first number line. Between which pair of thousands does this number come? (It comes between 1,000 and 2,000.) Look at the second number line. Between which pair of hundreds does this number come?" (It comes between 1,300 and 1,400.) Place a mark on the number line between 1,300 and 1,400. Say, "Look at the mark representing 1,347 on the number line. Is it closer to 1,000 or closer to 2,000?" (It is closer to 1,000.) On the chalkboard write 1,347 rounded to the nearest thousand is 1,000. Say, "Look at the number line that counts by hundreds. Which hundred is in the middle? (1,500 is in the middle.) When the hundreds digit is less than 5, we will round down to the lower thousand. If the hundreds digit is 5 or more, we will round up to the higher thousand."

Repeat this procedure with other 4- and 5-digit numbers, using the number line to round to the

4.01.03

STRATEGY 1: nearest thousand. Say, "Which digit helps us decide whether to round up or round down?" (The hundreds digit helps us decide. If it is less than 5, we round down to the lesser thousand. If it is 5 or more, we round up to the greater thousand.)

STRATEGY 2: Write pairs of 4- and 5-digit numbers on the chalkboard. Within each pair one number should round to the higher thousand. The other number should round to the lower thousand.
e.g.,

4,615	6,307	16,234	29,017
4,116	6,904	16,503	29,815

Say, "When we round numbers to the nearest ten, at which place do we look to decide whether to round up or down? (To round numbers to the nearest ten, we look at the digit in the ones place. If it is less than 5, we round down. If it is 5 or more we round up.) When we round numbers to the nearest hundred, at which place do we look to decide whether to round up or down?" (To round numbers to the nearest hundred, we look at the digit in the tens place to see if it is 5, less than 5, or more than 5.)

Say, "Look at the pairs of numbers on the chalkboard. Considering what was used to round numbers to the nearest ten or nearest hundred, at which place will we look if we want to round numbers to the nearest thousand? (To round numbers to the nearest thousand, we will look at the digit in the hundreds place.) What procedure should we use? (If the number in the hundreds place is less than 5, we will round to the lesser thousand. If it is 5 or more, we will round up to the greater thousand.) Look at the first pair of numbers. Between which pair of thousands do they come? (They come between 4,000 and 5,000.) To which

4.01.03

STRATEGY 2: thousand will we round 4,615? (We will round it up to 5,000 because the hundreds digit is 6. Therefore, 4,615 is closer to 5,000.) To which thousand will we round 4,116?" (We will round 4,116 down to 4,000 because the hundreds digit is less than 5. Therefore, 4,116 is closer to 4,000.)

Repeat this procedure using other 4- and 5-digit numbers.

4.01.03.02 round 4- and 5-digit numbers to the nearest hundred

STRATEGY 1: Adapt Strategy 1 and/or Strategy 2, P.O. 4.01.03.01.

STRATEGY 2: Write a 4-digit number on the chalkboard, e.g., 2,467. Ask a student to read the number. Say, "What is 2,467 rounded to the nearest thousand? (2,467 rounded to the nearest thousand is 2,000.) How do you know? (The digit in the hundreds place is less than 5, so we round to the lesser thousand.) When we round numbers to the nearest hundred, at which digit must we look? (We look at the tens digit.) We can round 4- and 5-digit numbers to the nearest hundred in the same way." Cover the thousands digit in 2,467. Say, "What is 467 rounded to the nearest hundred? (467 rounded to the nearest hundred is 500 because the tens digit is 6.) 467 rounded to the nearest hundred is 500, so 2,467 rounded to the nearest hundred is 2,500."

Repeat this procedure with other 4- and 5-digit numbers.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Round to the nearest thousand.

5,611 rounded to the nearest thousand is 6,000.

6,017 rounded to the nearest thousand is _____.

3,907 rounded to the nearest thousand is _____.

17,804 rounded to the nearest thousand is _____.

26,710 rounded to the nearest thousand is _____.

44,500 rounded to the nearest thousand is _____.

Round to the nearest hundred.

4,126 rounded to the nearest hundred is 4,100.

6,791 rounded to the nearest hundred is _____.

7,162 rounded to the nearest hundred is _____.

72,019 rounded to the nearest hundred is _____.

61,903 rounded to the nearest hundred is _____.

34,657 rounded to the nearest hundred is _____.

Solve these problems.

Mark delivered 1,464 newspapers last month. Sam delivered 1,672 newspapers. Who delivered closer to 2000 newspapers for the month?

Nadine traveled 2,640 miles to see her grandmother. Marcia traveled 2,688 miles. Who traveled closer to 2,700 miles?

Do you remember?

$$36 \div 6 = \square \quad 42 \div 7 = \square \quad 48 \div 6 = \square \quad 28 \div 7 = \square$$

$$6 \overline{) 18}$$

$$7 \overline{) 21}$$

$$6 \overline{) 30}$$

$$7 \overline{) 35}$$

Unit 9

4.10.01 MONEY TO FIFTY DOLLAR BILL

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

- *4.10.01.01A recognize and identify ten, twenty, and fifty dollar bills, and their equivalent monetary values;

e.g.,



a ten dollar bill = \$10.00 in value.



a twenty dollar bill = \$20.00 in value.



a fifty dollar bill = \$50.00 in value.

- *4.10.01.02A solve word problems related to skills learned in this module.

e.g.,

Jenny has \$50.00. She has fewer than four bills. What bills could she have?

VOCABULARYTERMS

currency
equivalent
monetary

GETTING STARTED 1:

Prepare and display large facsimiles of pennies, nickels, dimes, quarters, half-dollars, and dollar bills. On the chalkboard display the following chart:

<u>Currency Worth \$1.00</u>	<u>Currency Worth \$5.00</u>

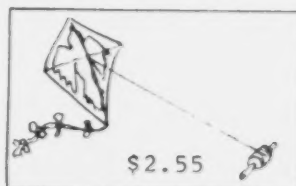
Ask a student to choose a set of coins worth one dollar and tape them in the column, labeled Currency Worth \$1.00. Continue this procedure with other students using different combinations of coins that equal one dollar.

Repeat this procedure as the students combine bills and coins equal to five dollars in value.

GETTING STARTED 2:

Prepare pictures of toys, games, books, or other items and play money (one dollar bills, five dollar bills, and coins). Distribute the play money to each student or group of students. Display a picture with a price on it.

e.g.,



Say, "How much does this kite cost? (It costs two dollars and fifty-five cents.) Count out two dollars and fifty-five cents using your

GETTING STARTED 2: cont'd

play money. What bills and coins did you use to make that amount?"
Record the combinations at the chalkboard.

e.g.,

2 one dollar bills
2 quarters
1 nickel

2 one dollar bills
1 half-dollar
5 pennies

Say, "How can we check that these coins and bills equal \$2.55?" (We can write the value of each set and find the total.)

e.g.,

2 one dollar bills = \$2.00
2 quarters = .50
1 nickel = .05
\$2.55

2 one dollar bills = \$2.00
1 half-dollar = .50
5 pennies = .05
\$2.55

Say, "There are many ways to express the same amount."

Repeat this procedure using the other pictures.

4.10.01.

4.10.01.01 recognize and identify ten, twenty, and fifty dollar bills and their equivalent money values

STRATEGY 1: Prepare large facsimiles of ten, twenty, and fifty dollar bills and play money (several one, five, ten, and twenty dollar bills, and 1 fifty dollar bill). Distribute the play money to each group of students. Divide a bulletin board or chalkboard into 3 areas: Currency Worth \$10.00, Currency Worth \$20.00, and Currency Worth \$50.00. Display the large facsimiles of the bills and ask the students to identify each bill. Say, "Several combinations can be used to show the value of each of these bills. How many different arrangements worth ten dollars can you make with your bills?" Ask the students to display their amounts on the chalkboard in the appropriate column.

Repeat this procedure with combinations of bills worth twenty dollars and fifty dollars.

STRATEGY 2: Prepare several facsimiles of one, five, ten, twenty, and fifty dollar bills. Display one facsimile of each bill. Say, "We will make a chart to help us learn the value of each bill." Draw a chart on the chalkboard.

e.g.,

Amount	one dollar bills	five dollar bills	ten dollar bills	twenty dollar bills	fifty dollar bills

Ask several students to identify the value of each bill and the name of the president on each bill. Say, "We are going to show several ways to represent the value of each bill. How many ones equal 1 ten? (10 ones equal 1 ten.) How many one dollar bills have a value equivalent to one ten dollar bill?" (10 one dollar bills are equivalent to 1 ten dollar bill.) Write this information on the chart.

4.10.01.

STRATEGY 2: e.g.,

cont'd

Amount	one dollar bills	five dollar bills	ten dollar bills	twenty dollar bills	fifty dollar bills
\$10.00	10				

Say, "How many other ways can we show equivalent values of \$10.00?" (Several answers are possible.) Ask the students to show the equivalent values by using facsimiles of the bills as the chart is completed.

e.g.,

Amount	one dollar bills	five dollar bills	ten dollar bills	twenty dollar bills	fifty dollar bills
\$10.00	10				
\$10.00		2			
\$10.00			1		
\$10.00	5	1			

Repeat this procedure with the twenty and fifty dollar bills.

4.10.01.02 solve word problems related to skills learned in this module

STRATEGY 1: Prepare and display a flannelboard and pictures of one dollar, five dollar, ten dollar, twenty dollar, and fifty dollar bills backed with felt. Say, "Brenda has 6 bills worth \$10.00. Which bills does Brenda have?" (Brenda has 5 one dollar bills and 1 five dollar bill.) Ask a student to show this combination on the flannelboard. Say, "David has 6 bills which are worth \$50.00. Which bills could David have?" (David could have 4 ten dollar bills and 2 five dollar bills or he could have 1 twenty dollar bill, 1 ten dollar bill, and 4 five dollar bills.) Ask a student to show both combinations on the flannelboard.

Repeat this procedure using other equivalent values for ten, twenty, and fifty dollars. Say, "Sometimes only one solution to the problem is possible. Other times there can be more than one solution."

4.10.01.

STRATEGY 2: Prepare and display 3 boxes labeled A, B, and C, respectively. Place 1 ten dollar bill and 2 five dollar bills in Box A. Place 1 twenty dollar bill, 2 ten dollar bills, and 2 five dollar bills in Box B. Place 5 one dollar bills and 1 five dollar bill in Box C.

Say, "Which box has bills which you could exchange for 1 fifty dollar bill? (You could exchange the bills in Box B for 1 fifty dollar bill.) ... a twenty dollar bill? (...Box A for a twenty dollar bill.) ... a ten dollar bill? (... Box C for a ten dollar bill.) Which box contains the fewest number of bills? (Box A contains the fewest number of bills, 3.) ... the greatest number of bills? (Box C contains the greatest number of bills, 6.) Is the value of each box related to the number of bills it contains?" (The value is not related to the number of bills. The 3 bills in Box A are worth twenty dollars. The 6 bills in Box C are worth only six dollars.)

Repeat this procedure, changing the bill combinations in each box to other equivalent values of ten dollars, twenty dollars, and fifty dollars.

NAME: _____ CLASS: _____ DATE: _____

Cut along the dotted lines. On another piece of paper, paste all the amounts having a value of ten dollars in a row, all the amounts having a value of twenty dollars in a second row, and all the amounts having a value of fifty dollars in a third row.

\$20.00



\$50.00



\$10.00

NAME: _____ CLASS: _____ DATE: _____

Solve each problem. There may be more than one solution to each problem.

I cost more than \$5.00 but less than \$30.00. You can pay for me by using two bills. Each bill is worth \$10.00. How much do I cost?



I cost less than \$25.00 but more than \$10.00. You can pay for me by using six bills. Five of the bills are equal in value. How much do I cost?



Which bills will you use?

I cost more than \$25.00 but less than \$50.00. You can pay for me by using four bills. Each bill has the same value. How much do I cost?



How will you pay for me?

I cost more than \$20.00 but less than \$50.00. I was paid for with three bills. Each bill has a different value. A one dollar bill was not used. How much do I cost?



What are the three bills?

CHALLENGE!

1. What two numbers have a product of 20 and a sum of 9?

2. What two numbers have a product of 28 and a sum of 11?

SHARPENING YOUR SKILLS

Units 7, 8, 9

Name: _____ Class: _____ Date: _____

1. $40,000 + 8,000 + 700 + 10 + 6 = \square$

(a) 408,716

(c) 48,706

(b) 48,716

(d) 487,106

2. $100,000 + 60,000 + 800 + 20 + 9 = \square$

(e) 160,829

(g) 16,829

(f) 106,809

(h) 168,209

3. Write 48,166 in expanded notation.

4. Write 135,200 in expanded notation.

5. 6,736 rounded to the nearest thousand is _____.

6. 21,594 rounded to the nearest thousand is _____.

7. What is 5,872 rounded to the nearest hundred?

(a) 5,800

(c) 6,000

(b) 5,900

(d) 5,000

8. What is 16,274 rounded to the nearest hundred?

(e) 16,000

(g) 16,200

(f) 16,300

(h) 15,000

9. I have two bills that total \$10.00. What are the two bills?

10. I have three bills that total \$20.00. What are the three bills?

11. Which of the following is equivalent to fifty dollars?

(a) 1 twenty dollar bill and 1 ten dollar bill

(b) 3 five dollar bills

(c) 2 twenty dollar bills and 1 ten dollar bill

(d) 3 ten dollar bills

4.14.03 REVIEW - ADDITION

(1 lesson/ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

4.14.03.01

compute sums of 2- and 3-digit numbers
without regrouping (exchange) and check;
e.g.,

	<u>check</u>		<u>check</u>
47	32	342	456
+32	+47	+456	+342
<u>79</u>	<u>79</u>	<u>798</u>	<u>798</u>

		<u>check</u>
23 + 41 = 	23	41
	+41	+23
	<u>64</u>	<u>64</u>

4.14.03.02

compute sums of 2- and 3-digit numbers with
regrouping (exchange) and check.
e.g.,

	<u>check</u>		<u>check</u>
25	17	326	148
+17	+25	+148	+326
<u>42</u>	<u>42</u>	<u>474</u>	<u>474</u>

		<u>check</u>
259 + 381 = 	259	381
	+381	+259
	<u>640</u>	<u>640</u>

VOCABULARYTERMS

sum
addend
regroup

GETTING STARTED 1:

Prepare and distribute an addition fact card to each student.

e.g.,

$$7 + 8 = \square$$

Ask a student to display his/her card and to select another student to complete the fact.

If the student selected to complete the fact is correct, he/she may display his/her fact card and select another student to respond.

Repeat this procedure until each student has had a chance to participate.

GETTING STARTED 2:

Prepare squared material (hundreds, tens, and ones). Display 7 tens and 15 ones.

e.g.,



Say, "How many tens and ones are shown?" (There are 7 tens and 15 ones.) What can we do whenever we have ten or more ones? (We can exchange 10 ones for 1 ten and place that ten with the other tens.)

e.g.,



Say, "Have we changed the total amount? (No. We only changed the way the amount was represented.) How much are 8 tens and 5 ones?" (8 tens and 5 ones equal 85.) On the chalkboard write: 7 tens + 15 ones = 8 tens + 5 ones = 85.

Repeat this procedure with other 2- and 3-digit numbers.

4.14.03

4.14.03.01 compute sums of 2- and 3-digit numbers without regrouping (exchange) and check

STRATEGY 1: Prepare and distribute a place value chart and squared material (hundreds, tens, and ones) to each student or group of students. Write a word problem on the chalkboard and ask a student to read it aloud.
e.g.,

Jessica has 24 dolls in her house.
Her friend Milta has 31 dolls.
How many dolls do they have in all?

Say, "What must we find? (We must find out how many dolls they have together.) How many dolls does Jessica have? (Jessica has 24 dolls.) Use your squared material to show the number 24. How did you show 24? (I used 2 tens and 4 ones.) Show 24 on the place value chart." Repeat this procedure for 31.
e.g.,

Hundreds	Tens	Ones
	2	4
	3	1

Say, "What must we do to solve the problem? (We must add the two numbers.) What clue or key word in the problem tells us this? (The words "in all" tell us to join the two groups together. We can do that by adding.) Write a plus symbol in the example on your place value chart."
e.g.,

Hundreds	Tens	Ones
	2	4
	+ 3	1

4.14.03

STRATEGY 1: cont'd

Say, "In which column shall we begin?" (We will begin in the ones column.) Ask the students to add the ones using their squared material and to write the total in the ones column on their place value chart. Repeat this procedure with the tens.

Say, "How can we check to make sure our answer is correct?" (We can reverse the addends and add again.) Ask a student to check the problem at the chalkboard. Say, "Can anyone think of another way to check the answer?" Lead the students to discover that they can also check by adding up, or simply reversing the order in which they add.

e.g.,

	Hundreds	Tens	Ones	Check
Add:		2	4	↑ add up
		+3	1	
		5	5	

Ask a student to state the answer and write it on the chalkboard. (There are 55 dolls in all.)

Repeat this procedure using other 2- and 3-digit addends.

Note: Addition may also be presented in horizontal format. In such cases, students should be instructed to rewrite the example in vertical format before adding.

STRATEGY 2: Prepare several word problems requiring addition of 2- and 3-digit numbers without regrouping. Write a problem on the chalkboard and ask a student to read the problem aloud.

e.g.,

Marie and Anna put all their comic books into a big box. Marie put in her 74 comics and Anna added her 25. How many comic books were in the box?

Say, "What do we have to find? (We must find out how many comic books are in the box.) What operation

4.14.03

STRATEGY 2: will we use? (We will add.) How do you know?"
cont'd (Accept any reasonable response.) Ask a student to write the addition example we need to solve this problem on the chalkboard.
e.g.,

$$\begin{array}{r} 74 \\ +25 \\ \hline \end{array}$$

Say, "What steps shall we follow to find the sum?"
(First we add the ones, then we add the tens.) Ask a student to demonstrate these steps at the chalkboard.
e.g.,

$$\begin{array}{r} 74 \text{ comic books} \\ +25 \text{ comic books} \\ \hline 99 \text{ comic books} \end{array}$$

Say, "What is the sum of 74 and 25? (The sum of 74 and 25 is 99.) How can we check the sum?" (We can reverse the addends and add again or we can add up.) Ask a student to check the sum at the chalkboard. Ask another student to state the answer to the problem and write it on the chalkboard. (There are 99 comic books in the box.)

Repeat this procedure with other addition examples having 2- and 3-digit addends.

See Note after Strategy 1.

4.14.03.02 compute sums of 2- and 3-digit numbers with regrouping (exchange) and check

STRATEGY 1: Prepare and distribute a place value chart and squared material (hundreds, tens, and ones) to each student or group of students. Write a word problem on the chalkboard.
e.g.,

In class 4-207, there are 27 students. In class 4-209, there are 29 students. The classes have gym at the same time. How many students are in the gym at that time?

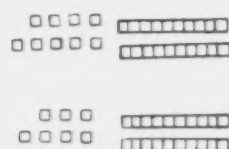
4.14.03

STRATEGY 1: cont'd

Ask a student to read the problem aloud. Say, "What do we have to find? (We have to find how many students are in the gym in all.) How can we find out? (We can add the number of students in both classes.) What numbers shall we add?" (We shall add 27 and 29.)

Ask the students to show the two numbers using their squared material and to write the two addends on their place value charts.

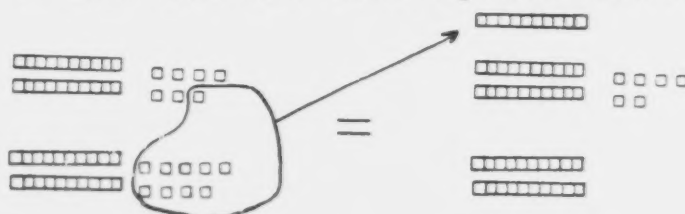
e.g.,



Hundreds	Tens	Ones
	2	7
	+ 2	9

Say, "In which column shall we begin? (We will begin in the ones column.) What must we do when we have 16 ones? (We must exchange 10 ones for 1 ten.) Ask the students to show this with their squared material and charts.

e.g.,



Say, "How many tens do we have now? (We have 5 tens.) What is the sum?" (The sum is 56.) Ask the students to complete the example on place value chart.

e.g.,

Hundreds	Tens	Ones
	1	
	2	7
	+ 2	9
	5	6

Say, "How can we check our sum? (We can reverse the addends and add again.) Is there another way to check our addition?" (We can add up.) Ask a student to state the answer to the problem and write it on the chalkboard. (There are 56 students in the gym at that time.)

4.14.03

STRATEGY 1: Repeat this procedure with other 2- and 3-digit addends.
cont'd

See **Note** after Strategy 1, P.O. 4.14.03.01.

STRATEGY 2: Prepare a set of word problems requiring addition of 2- and 3-digit numbers with regrouping.

e.g.,

Our classroom has 34 chairs. The
classroom next door has 37 chairs.
If we use every chair, how many
students can sit in both rooms?

Say, "What do we have to find?" (We have to find the total number of students who can sit in the two rooms.) What information do we know? (We know how many seats are in each room.) What must we do to find the answer? (We must add 34 and 37.) What clue or key word in the problem tells us to add?" (The word "both" tells we want to join two groups.) Ask a student to write the example needed to solve the problem on the chalkboard.

e.g., 34 chairs
 +37 chairs

Say, "In which column do we add first? (We add the, ones first.) How many ones are there? (There are 11 ones.) What can we do with the 11 ones? (We can exchange ten ones for 1 ten.) Why do we have to exchange the ones? (We cannot have more than 9 in any one place value.) How many ones will be in the sum now? (There will be 1 one in the sum.) Add the tens. How many tens are there in all?" (There are 7 tens.) Ask a student to write the sum at the chalkboard. Say, "How can we check our sum? (We can check by adding up.) What is the answer to the problem?" (71 students can sit in the two rooms.)

Repeat this procedure using 3-digit addends with one and two regroupings. After adding, ask the students to check their work.

See **Note** after Strategy 1, P.O. 4.14.03.01.

NAME: _____ CLASS: _____ DATE: _____

Solve and check.

1. <u>check</u> $\begin{array}{r} 23 \\ + 14 \\ \hline \end{array}$	2. <u>check</u> $\begin{array}{r} 66 \\ + 31 \\ \hline \end{array}$	3. $54 + 25 = \boxed{}$ <u>check</u>	
4. <u>check</u> $\begin{array}{r} 127 \\ + 131 \\ \hline \end{array}$	5. <u>check</u> $\begin{array}{r} 466 \\ + 223 \\ \hline \end{array}$	6. <u>check</u> $\begin{array}{r} 151 \\ + 427 \\ \hline \end{array}$	
7. <u>check</u> $\begin{array}{r} 38 \\ + 17 \\ \hline \end{array}$	8. <u>check</u> $\begin{array}{r} 49 \\ + 65 \\ \hline \end{array}$	9. <u>check</u> $\begin{array}{r} 58 \\ + 39 \\ \hline \end{array}$	
10. <u>check</u> $\begin{array}{r} 425 \\ + 396 \\ \hline \end{array}$	11. <u>check</u> $\begin{array}{r} 317 \\ + 475 \\ \hline \end{array}$	12. $663 + 294 = \boxed{}$ <u>check</u>	
Do you remember? $3 \times 8 = \boxed{}$ $5 \times 9 = \boxed{}$ $7 \times 8 = \boxed{}$			
$\begin{array}{r} 9 \\ \times 2 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ \times 7 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ \times 5 \\ \hline \end{array}$

4.02.01 ADDITION OF NUMBERS THROUGH 4-DIGITS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*4.02.01.01A

estimate sums by rounding addends to the largest place;

e.g.,

4,742	rounds to	5,000	
<u>+3,116</u>	rounds to	<u>+3,000</u>	(estimated sum)
		8,000	

4.02.01.02A

add two or more addends in vertical or horizontal format with or without regrouping (exchange) and check;

e.g.,

$$3,586 + 213 + 1,224 + 12 = \boxed{}$$

		check
3,586	↑	
213		add
1,224		up
+ 12		
<u>5,035</u>		

		check
\$25.43	↑	
16.84		add
+ 3.05		up
<u>\$45.32</u>		

4.02.01.03A

solve word problems related to skills
learned in this module.

e.g.,

1,482 students attend P.S.124,
3,040 students attend P.S.88,
and 655 students attend P.S.92.

What is the total student population
of the three schools?

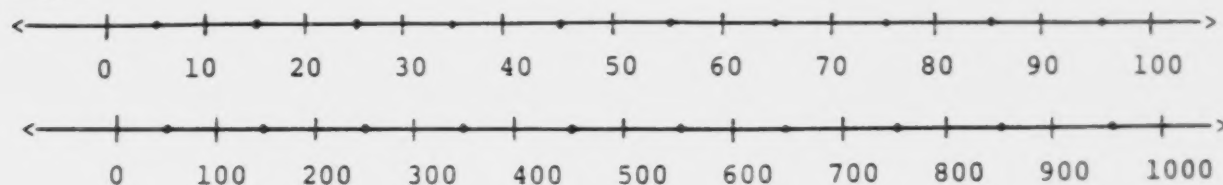
VOCABULARYTERMS

estimate
addends
sums
vertical
horizontal

GETTING STARTED 1:

Prepare two number lines, one counting by tens through one hundred and one counting by hundreds through one thousand.

e.g.,



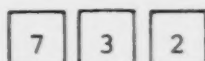
Say, "We can use the first number line for rounding to the nearest ten. The dots represent the midpoint, or halfway mark, between each pair of tens. What numbers are represented by the dots? (The dots represent 5, 15, 25, . . . , 95.) Where would we find the number 18? (We would find 18 between 10 and 20.) What number is at the midpoint between 10 and 20? (15 is at the midpoint between 10 and 20.) Is 18 before the midpoint or after the midpoint? (18 is after the midpoint.) Since 18 is past the midpoint, to which ten shall we round 18?" (Eighteen rounded to the nearest ten is twenty.) Continue rounding 2-digit numbers to the nearest ten. Say, "When do we round to the lower ten? (We round to the lower ten if the ones digit is less than 5.) When do we round to the higher ten?" (We round to the higher ten when the ones digit is 5 or more.)

Repeat this procedure using the hundreds number line and rounding 3-digit numbers to the nearest hundred. Say, "When do we round to the lower hundred? (We round to the lower hundred when the tens digit is less than 5.) When do we round to the higher hundred?" (We round to the higher hundred when the tens digit is 5 or more.)

GETTING STARTED 2:

Prepare 20 large oaktag cards with 1 digit written on each and a place value pocket chart for ones through thousands. Place three numeral cards next to each other on the chalk ledge.

e.g.,



Say, "What number is this? (This is the number seven hundred thirty two.) Where does the 7 belong on our place value chart?" (The 7 belongs in the hundreds column.) Ask a student to place the card in the hundreds column.

e.g.,

Thousands	Hundreds	Tens	Ones
	7		

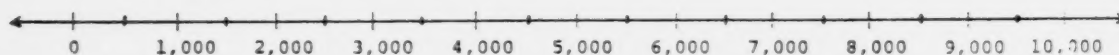
Say, "How would you read this number? (This number is seven hundred.) Where should we put the 2? (Put the 2 in the ones column.) Now how would you read the number? (The new number is seven hundred two.) Where does the 3 belong? (The 3 belongs in the tens place.) How shall we read the number now? (The number is seven hundred thirty-two.) What would happen if we changed the order of our digits?" (The value of the number would change.) Ask a student to use the same cards to create a number lower in value than 732, e.g., 327. Say, "Can we create a number higher in value than 732 with these three cards? (No.) Why not?" (We have already placed the digit with the greatest value in the highest place value. We have placed the digit with the least value in the lowest place value.)

Repeat this procedure using the numeral cards to make 4-digit numbers.

4.02.01

4.02.01.01 estimate sums by rounding addends to the largest place

STRATEGY 1: Prepare and display a number line on the chalkboard.
e.g.,



Say, "This number line counts by thousands. Look at the mark halfway between 0 and 1,000. What number does it represent? (It represents 500.) How do you know? (Half of 1,000 is 500.) What does the mark half-way between 1,000 and 2,000 represent?" (It represents 1,500.) Repeat this procedure for naming the remaining midpoints between each pair of thousands.

Say, "In order to estimate sums, it is helpful to round each addend first. Let's use the number line to help us round each addend."

Write an addition example on the chalkboard.
e.g.,

$$\begin{array}{r} 4,380 \\ +2,976 \\ \hline \end{array}$$

Say, "We will estimate to find about how much the total will be. Look at the first addend. Between which pair of thousands is it located on the number line? (It is between 4,000 and 5,000.) Is it closer to 4,000 or to 5,000? (It is closer to 4,000.) How do you know? (It comes before the midpoint, 4,500, so it is closer to 4,000.) How can you round to the nearest thousand another way?" (I can look at the digit in the hundreds place. If its less than 5, I will round down. If it is 5 or more, I will round up.)

Ask a student to write the rounded number next to each addend and find the estimated sum.

4.02.01

STRATEGY 1: e.g.,

cont'd

4,380 rounded to the nearest thousand is 4,000
+2,976 rounded to the nearest thousand is +3,000

7,000 estimated
sum

Say, "Once we round the addends, we can often estimate the sum without pencil and paper. The estimate will give us an idea of about what the sum will be. We can also compare actual sums to estimates to see if the answer is reasonable."

Repeat this procedure by writing other addition examples on the chalkboard and ask the students to mentally estimate the sums.

STRATEGY 2: Prepare a set of addition problems requiring students to round the addends before estimating the sums.

e.g.,

Willie had 2,358 marbles in one
container and 733 in another.
About how many marbles did he have?

Ask a student to read the problem aloud. Say, "What does the problem ask you to do? (The problem asks us to estimate the sum.) How do you know you should estimate rather than solve for the exact answer? (The problem says about how many.) Should you round to the nearest ten, nearest hundred, or nearest thousand?" (The problem does not tell us which to do.)

Discuss the difference between the three. Say, "Which will bring us a more exact answer? (Rounding to the nearest ten will be most exact.) Which will be easiest to add mentally?" (Rounding to the largest place makes estimating sums easier.)

4.02.01

STRATEGY 2: Ask a student to write the example on the chalkboard and round each addend to the largest place.

cont'd

e.g.,

2,358 rounded to the nearest thousand is 2,000
+ 733 rounded to the nearest thousand is +1,000

Say, "We can add the rounded addends mentally. What will be the estimated sum?" (The estimated sum will be 3,000.) Ask a student to write and label the estimated sum on the chalkboard.

Repeat this procedure with other addition examples. Say, "How does rounding addends help us to estimate sums? (Rounding addends makes estimating the sum easier.) To which place did we round each addend? (We rounded each addend to the largest place.) When would you need to estimate sums?" (Accept any reasonable responses.)

4.02.01.02 add 2 or more addends in vertical or horizontal format with or without regrouping (exchange) and check

STRATEGY 1: Prepare a place value chart for ones through thousands.

e.g.,

Thousands	Hundreds	Tens	Ones

Say, "We are going to use the place value chart to help us add several addends." Ask a student to write the number 4,755 on the chart. Repeat this procedure for the numbers 971 and 3,612.

Say, "How can we estimate the sum? (We can round each addend to the nearest thousand and add the rounded addends.) How will we round 4,755?" (4,755 rounds to 5,000.) On the chalkboard write 5,000.

4.02.01

STRATEGY 1:

cont'd

Repeat this procedure with the other addends. Say, "What is the estimated sum?" (The estimated sum is 9,000.) On the chalkboard write estimated sum =9,000. Ask a student to come to the chalkboard and to begin the addition. Say, "What must we do when we have 10 or more ones?" (We must exchange 10 ones for 1 ten.)

Ask other students to add the remaining columns, exchanging when necessary. Say, "What is the sum? (The sum is 9,338.) How does this sum compare to our estimate? (The sum 9,338 is reasonable compared to our estimate of 9,000.) How can we check our addition? (We can either reverse the order of the numbers and add again or we can add up.) Which method of checking is easier when adding several numbers?" (Adding up is the easier method.) Ask a student to check the sum by adding up.

Write an example in horizontal format on the chalkboard.

e.g.,

$$\$2.52 + \$11.87 + \$26.39 = \boxed{}$$

Say, "Why is it difficult to add these four numbers? (It is difficult because you can't see place columns.) How can you show place columns?" (We can rewrite the example vertically.) Ask a student to rewrite the example vertically on the chalkboard as the other students write it in their notebooks.

e.g.,

$$\begin{array}{r} \$ 2.52 \\ 11.87 \\ + 26.39 \\ \hline \end{array}$$

Ask the students to estimate the sum, solve the example, and check the sum. Repeat this procedure with other examples.

STRATEGY 2:

Prepare and display a set of addition examples in horizontal format.

4.02.01

STRATEGY 2: e.g.,

cont'd

$$1,953 + 2,012 + 289 = \boxed{}$$

$$\$1.69 + \$12.71 + \$8.58 + \$5.31 = \boxed{}$$

Say, "Why is it difficult to add when an example has several addends written horizontally? (It is difficult to keep track of all the ones, tens, hundreds, and thousands. What can we do to make the addition easier?" (We can rewrite the example vertically.) Ask a student to rewrite the first example vertically on the chalkboard as the other students write it in their notebooks. Say, "Before we add, we will estimate the sum." Ask the students to round each addend and find the estimated sum in their notebooks as one student works at the chalkboard.

e.g.,

1,953	rounds to	2,000	
2,012	rounds to	2,000	
<u>289</u>	rounds to	300	
		4,300	= estimated sum

Ask a student to complete the addition examples at the chalkboard as the other students complete it in their notebooks. Say, "What did you do each time you had 10 or more in any column? (I exchanged 10 for 1 in the next higher column.) What is the sum? (The sum is 4,254.) How does this sum compare to our estimate? (The sum 4,254 is very close to our estimate.) How can we check our answer?" (We can add up.) Ask a student to check the sum by adding up and comparing the results. Say, "What does the fact that the results are the same tell us? (It tells us that we probably added correctly.) Why does it help us to always check our answers?" (It is important to check because sometimes we make a mistake. Checking will often catch the mistake.) Repeat this procedure using several other examples.

4.02.01

4.02.01.03 solve word problems related to skills learned in this module

STRATEGY 1: Prepare a place value chart. Write a word problem on the chalkboard.

e.g.,

Last week, Sam, the Soda Man delivered 1,857 bottles of soda to Apple Supermarket, 638 bottles to Benny's Grocery, 2,142 to Big Bob's Food Store, and 855 to Al's Superette. How many bottles of soda did Sam, the Soda Man, deliver last week?

Say, "What are we asked to find?" (We are asked to find the number of bottles Sam delivered.)

Ask a student to estimate the answer by rounding the number of bottles of soda Sam delivered.

Say, "How can we solve this problem? (We can add all four amounts.) How can a place value chart help us?" (It can help us keep all the numbers in the correct columns.) Ask a student to solve the problem at the chalkboard using the place value chart.

e.g.,

Thousands	Hundreds	Tens	Ones	
1	8	5	7	rounds to 2,000
	6	3	8	rounds to 600
2	1	4	2	rounds to 2,000
+	8	5	5	rounds to 900
				5,000 estimated sum
5	4	9	2	actual sum

4.02.01

STRATEGY 1: Say, "Was our estimate close to the actual sum? (Yes.) How can we check the sum?" (We can check by adding up.) Ask another student to come to the chalkboard and check the sum. Say, "What is the answer to the problem?" (Sam delivered 5,492 bottles of soda last week.) Ask the students to write the answer in their notebooks.

Repeat this procedure with other problems.

STRATEGY 2: Prepare and display a word problem.
e.g.,

At the parade there were 1,425
marchers, 1,831 people playing
in bands, and 843 flag bearers.

How many people were in the parade?

Ask a student to read the problem aloud. Say, "How can we find the total number of people in the parade?" (We can add to find the total.) Ask a student to write the addends on the chalkboard in vertical form.

e.g.,

$$\begin{array}{r} 1,425 \\ 1,831 \\ + \quad 843 \\ \hline \end{array}$$

Say, "First we will estimate the sum to find out about how many people were in the parade. How can we find the estimate? (We can round each addend to the nearest thousand and add the rounded numbers.) To which thousand shall we round 1,425? (1,425 rounds to 1,000.) To which thousand shall we round 1,831? (1,831 rounds to 2,000.) To which thousand shall we round 843? (843 rounds to 1,000.) What is the estimated sum?" (1,000 + 2,000 + 1,000 equals 4,000, which is the estimated sum.) Write each rounded number on the chalkboard along with the estimated sum.

STRATEGY 2: Ask a student to find the actual sum and compare the actual sum to the estimated sum.

cont'd

e.g.,

1,000

2,000

+1,000

4,000 estimated
sum

1,425

1,831

+ 843

4,099 people in the parade

Say, "How can we check our sum?" (If we added down, we can add up as a check.) Ask a student to check the sum. Say, "What is the answer to the problem?" (There were 4,099 people in the parade.)

Repeat this procedure using other word problems.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Round each number to its largest place.

5,725 <u>6,000</u>	7,182 _____	611 _____	849 _____
3,169 _____	2,749 _____	708 _____	499 _____

Round each addend to the largest place and find the estimated sum.

① 4,321 rounded to the nearest thousand is _____
 + 1,892 rounded to the nearest thousand is _____
 estimated sum _____

② 3,749 rounded to the nearest thousand is _____
 912 rounded to the nearest thousand is _____
 + 6,714 rounded to the nearest thousand is _____
 estimated sum _____

③ 291 rounded to the nearest hundred is _____
 + 792 rounded to the nearest hundred is _____
 estimated sum _____

④ 5,368 rounded to the nearest thousand is _____
 2,981 rounded to the nearest thousand is _____
 + 1,215 rounded to the nearest thousand is _____
 estimated sum _____

Solve.

- | | |
|---|--|
| ① Matt's Market sold 1,865 cans of apple juice, 2,440 cans of grape juice, and 619 cans of pineapple juice. About how many cans of juice were sold? | ② A jet flew 2,579 miles. Then it refueled and flew 4,790 miles. About how many miles did the jet fly? |
|---|--|

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Find the sums. Check.

$$\begin{array}{r} 1. \quad 2,468 \\ \quad 1,691 \\ \quad \quad 124 \\ + \quad \quad 416 \\ \hline \end{array}$$

$$\begin{array}{r} 2. \quad 3,745 \\ \quad \quad 1,379 \\ + \quad 2,101 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad \$10.08 \\ \quad \quad 6.29 \\ \quad \quad 43.01 \\ + \quad \quad .62 \\ \hline \end{array}$$

$$4. \quad 517 + 268 + 1,403 + 3,260 = \boxed{}$$

$$5. \quad 2,403 + 1,691 + 3,500 + 29 = \boxed{}$$

Solve and check.

- ① 1,568 circus tickets were sold last weekend. This weekend 2,147 tickets were sold. How many tickets were sold both weekends?

SolveCheck

- ② A token clerk sold 1,571 tokens on Monday, 991 tokens on Tuesday, 2,046 tokens on Wednesday, and 1,740 tokens on Thursday. How many tokens were sold during the four days?

SolveCheck**CHALLENGE!**

Ms. Sanders bought a dress for \$66.92, a top for \$21.17, and a hot dog for \$1.25. She left her house with \$100.00. How much money did she have when she came home? _____

4.14.04 REVIEW - SUBTRACTION

(1 lesson/ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

4.14.04.01

compute differences of 2- and 3-digit numbers without regrouping (exchange) and check;

e.g.,

$$\begin{array}{r} 78 \\ -43 \\ \hline 35 \end{array} \quad \begin{array}{r} \text{check} \\ 35 \\ +43 \\ \hline 78 \end{array}$$

$$\begin{array}{r} 975 \\ -362 \\ \hline 613 \end{array} \quad \begin{array}{r} \text{check} \\ 613 \\ +362 \\ \hline 975 \end{array}$$

$$67 - 32 = \boxed{} \quad \begin{array}{r} 67 \\ -32 \\ \hline 35 \end{array} \quad \begin{array}{r} \text{check} \\ 35 \\ +32 \\ \hline 67 \end{array}$$

4.14.04.02

compute differences of 2- and 3-digit numbers with regrouping (exchange) and check.

e.g.,

$$\begin{array}{r} 814 \\ \cancel{8}14 \\ -27 \\ \hline 67 \end{array} \quad \begin{array}{r} \text{check} \\ 67 \\ +27 \\ \hline 94 \end{array}$$

$$\begin{array}{r} 891 \\ \cancel{8}91 \\ -256 \\ \hline 635 \end{array} \quad \begin{array}{r} \text{check} \\ 635 \\ +256 \\ \hline 891 \end{array}$$

$$391 - 147 = \boxed{} \quad \begin{array}{r} 391 \\ \cancel{3}91 \\ -147 \\ \hline 244 \end{array} \quad \begin{array}{r} \text{check} \\ 244 \\ +147 \\ \hline 391 \end{array}$$

VOCABULARYTERMS

difference
 minuend
 subtrahend
 regroup
 exchange
 digit

GETTING STARTED 1:

Prepare subtraction flash cards and enough 1-digit numeral cards so that each student may receive 3 cards. Distribute 3 single digit number cards to each student. Display a subtraction fact flash card. e.g.,

17 - 9 =

Say, "What is the difference? (The difference is 8.) If you are holding a card with the numeral 8 on it, place it on your desk." Repeat this procedure until a student has used all three of his/her cards and is the winner. The winner may show the flash cards for the next game.

GETTING STARTED 2:

Prepare and display a place value chart through hundreds and squared material (hundreds, tens, and ones). Write a 2-digit number on the chalkboard. Ask a student to write that number in the place value chart.

e.g.,

hundreds	tens	ones
3	9	

Ask another student to display the same amount using squared material. Say, "How many tens and ones are in 39? (There are 3 tens and 9 ones in 39.) What is the value of the 3 tens? (The value of the 3 tens is 30.) What is the value of the 9 ones?" (The 9 ones equal 9.)

Repeat this procedure with other 2- and 3-digit numbers.

4.14.04

4.14.04.01 compute differences of 2- and 3-digit numbers without regrouping (exchange) and check

STRATEGY 1: Prepare and distribute to each group of students (or display) squared material (9 hundreds, 9 tens, and 9 ones.) Say, "There are 67 students in the gym. Show 67 using your squared material.

e.g.,



Mr. Gomez asked his class to line up and follow him out of the gym. Thirty-two students left with Mr. Gomez. How can we find out how many students are left in the gym? (We can subtract 32 from 67.) Why can't we add to solve this problem? (If we add, the sum will be greater than 67. We know that the number of students left must be less than 67.) Subtract using your squared material. How many students were still in the gym? (There were 35 students still in the gym.) How did we find the number of students who were still in the gym?" (We subtracted the number of students who left the gym from the number of students who were in the gym.) Ask a student to write and solve the example at the chalkboard as the other students solve it in their notebooks.

e.g.,

$$\begin{array}{r} 67 \\ -32 \\ \hline 35 \end{array}$$

Say, "How can we check our answer? (We can add the difference, 35, to the subtrahend, 32. The total should be the minuend, 67.) Using your squared material, add the difference, which was 35, to the subtrahend, which was 32. What is the total? (The total is 67.) Is that the same number as the minuend?" (Yes.) Ask a student to show the check at the chalkboard.

4.14.04

STRATEGY 1: e.g., check
 cont'd 67 minuend 35

-32 subtrahend +32
 35 difference 67

Say, "What is the answer to the problem?" (There are 35 students left in the gym.)

Repeat this procedure with other 2- and 3- digit numbers.

Note: Subtraction may also be presented in horizontal format. In such cases, students should be instructed to rewrite the example in vertical format before subtracting.

STRATEGY 2: Prepare and distribute a sheet of lined paper to each student. Demonstrate as you say, "Fold your paper into 3 columns. Label the columns **hundreds**, **tens**, and **ones**."

e.g.,

hundreds	tens	ones

Say, "Write the number 249 in the appropriate place value columns. In which column did you write the 2? ...4? ...9? (The 2 belongs in the hundreds column, the 4 in the tens column and the 9 in the ones column.) Write the number 214 in the appropriate columns beneath 249. In which column did you write the 2? ...1? ...4? (The 2 belongs in the hundreds column, the 1 in the tens column and the 4 in the ones column.) Write a minus symbol in front of the 2 in 214 and a line beneath these numbers. We will subtract 214 from 249."

e.g.,

hundreds	tens	ones
2	4	9
-2	1	4

4.14.04

STRATEGY 2:

cont'd

Say, "In which column do we begin subtracting? (We begin in the ones column.) How much is 9 ones minus 4 ones? (9 ones minus 4 ones equals 5 ones.) Write 5 in the ones column. How much is 4 tens minus 1 ten? (4 tens minus 1 ten equals 3 tens.) Write 3 in the tens column. How much is 2 hundreds minus 2 hundreds? (2 hundreds minus 2 hundreds equals 0.) When 0 is the first digit in a number we do not have to write it. How much is 249 minus 214? (249 minus 214 equals 35.) How did you find the difference?" (I subtracted the subtrahend which is 214 from the minuend which is 249.)

Say, "How can we check our answer? (We add the difference to the subtrahend. If they add up to the same number as the minuend, our answer is correct.) Ask the students to check their example on the back of their paper.

e.g., check

214

+35

249

Repeat this procedure with other 2- and 3-digit numbers.

See **Note** after Strategy 1.

4.14.04.02

compute differences of 2- and 3-digit numbers with regrouping (exchange) and check

STRATEGY 1:

Prepare and distribute to each student or group of students (or display) squared material (9 hundreds, 19 tens and 19 ones). Write on the chalkboard and say, "There are 53 cookies in a box." Ask the students to show 53 using their squared material.

e.g.,



ooo

144

4.14.04

STRATEGY 1: cont'd

Write on the chalkboard and say, "Mrs. Jones promised to give 35 students each one cookie. How can we find out how many cookies she will have left? (We will subtract 35 from 53.) What clue in the problem tells us this? (We are asked to find how many cookies are left.) Can we show this with the squared material you now have displayed? (No, we cannot subtract 35 because we cannot take 5 ones from 3 ones.) What must we do to be able to subtract 35? (We must exchange a tens strip for 10 ones.) Perform this exchange."

After the exchange has been made, say, "How many tens do you have now? (I have 4 tens.) How many ones do you have now? (I have the 10 ones I got from the exchange plus the 3 ones I had, so I have 13 ones.) Now how can you perform the subtraction? (I can subtract the ones and then subtract the tens.) What is the difference?" (The difference is 18.) Ask a student to solve the example at the chalkboard and describe the regrouping as he/she completes the example.

e.g.,
$$\begin{array}{r} 4\cancel{1}3 \\ -35 \\ \hline 18 \end{array}$$
 minuend
-35 subtrahend
18 difference

Say, "How can we check the difference?" (We can add the difference to the subtrahend. The total should equal the minuend. If it does, our answer is correct.) Ask a student to check the example at the chalkboard.

e.g.,	$\begin{array}{r} 4\cancel{1}3 \\ -35 \\ \hline 18 \end{array}$	minuend	$\begin{array}{r} 18 \\ +35 \\ \hline 53 \end{array}$
	-35	subtrahend	+35
	18	difference	53

4.14.04

STRATEGY 1: Say, "What is the answer to the problem?" (Mrs. Jones has 18 cookies left.)
cont'd

Repeat this procedure with other 2- and 3-digit numbers. Ask the students to solve the examples using the squared material and then write and solve the examples in their notebooks.

See **Note** after Strategy 1, P.O. 4.14.04.01.

STRATEGY 2: Prepare and distribute a sheet of lined paper to each student. Demonstrate as you say, "Fold your paper into 3 columns. Label the columns **hundreds**, **tens**, and **ones**."

e.g.,

hundreds	tens	ones

Write the number 432 in the appropriate place value columns. In which column did you write the 4? ...3? ...2? (The 4 belongs in the hundreds column, the 3 in the tens column, and the 2 in the ones column.) Write the number 286 in the appropriate columns beneath 432. In which column did you write the 2? ...8? ...6? (The 2 belongs in the hundreds column, the 8 in the tens column, and the 6 in the ones column.) Write a minus symbol to the left of 286 and draw a line beneath these numbers."

e.g.,

hundreds	tens	ones
4	3	2
-2	8	6

Say, "In which column do we begin subtracting? (We begin subtracting in the ones column.) Can you subtract 6 ones from 2 ones? (We cannot subtract 6 ones from 2 ones.) Why not? (There are not enough ones.) What must we do? (We must exchange 1 ten for 10 ones.) If we exchange 1 ten for 10 ones, how many

4.14.04

STRATEGY 2: tens will be left? (There will be 2 tens left.) How many ones will you have now? (I will have 12 ones.) Show the exchange in your example."

e.g.

hundreds	tens	ones
4	² ~~2~~	¹² ~~2~~
-2	8	6

Say, "Now subtract the ones. How many are left? (12 minus 6 equals 6.) Write the difference in the ones column. Let's go to the tens column. Can you subtract 8 tens from 2 tens? (You cannot subtract 8 from 2.) What must we do? (We must exchange 1 hundred for 10 tens.) How many hundreds will you have left after the exchange? (I will have 3 hundreds.) How many tens will you have? (I will have 12 tens.) Show the exchange in your example."

e.g.,

hundreds	tens	ones
3 ~~1~~	¹² ~~2~~	¹² ~~2~~
-2	8	6
		6

Say, "How much is 12 tens minus 8 tens? (12 tens minus 8 tens equals 4 tens.) Write the difference in the tens column. Let's go to the hundreds column. Can we subtract the hundreds? (Yes.) How much is 3 hundreds minus 2 hundreds? (3 hundreds minus 2 hundreds equals 1 hundred.) Write the difference in the hundreds column. Now look at the whole example."

e.g.,

hundreds	tens	ones
3 ~~1~~	¹² ~~2~~	¹² ~~2~~
-2	8	6
1	4	6

- 14S.6 - 147

4.14.04

STRATEGY 2:
cont'd

Say, "How much is 432 minus 286? (432 minus 286 equals 146.) How can we check our answer?" (We add the difference to the subtrahend. If they add up to the same number as the minuend, our answer is correct.) Ask the students to check their work on the back of their paper.

e.g.,
$$\begin{array}{r} \text{check} \\ 146 \\ +286 \\ \hline 432 \end{array}$$

Repeat this procedure with other 2- and 3-digit numbers.

See Note after Strategy 1, P.O. 4.14.04.01.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

A. Circle the examples which need regrouping (exchange) to find the difference.

1.
$$\begin{array}{r} 439 \\ - 12 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 650 \\ - 139 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 824 \\ - 445 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 921 \\ - 160 \\ \hline \end{array}$$

5.
$$\begin{array}{r} 67 \\ - 46 \\ \hline \end{array}$$

B. Solve and check each example.

1.
$$\begin{array}{r} 237 \\ - 114 \\ \hline \end{array}$$
 check
$$\begin{array}{r} 123 \\ + 114 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 503 \\ - 121 \\ \hline \end{array}$$
 check

3.
$$\begin{array}{r} 88 \\ - 49 \\ \hline \end{array}$$
 check

4.
$$\begin{array}{r} 87 \\ - 64 \\ \hline \end{array}$$
 check

5.
$$\begin{array}{r} 795 \\ - 678 \\ \hline \end{array}$$
 check

6.
$$\begin{array}{r} 364 \\ - 142 \\ \hline \end{array}$$
 check

7.
$$\begin{array}{r} 481 \\ - 246 \\ \hline \end{array}$$
 check

8.
$$\begin{array}{r} 79 \\ - 43 \\ \hline \end{array}$$
 check

9. $835 - 161 = \boxed{}$ check

10.
$$\begin{array}{r} 904 \\ - 403 \\ \hline \end{array}$$
 check

11. $63 - 48 = \boxed{}$ check

12.
$$\begin{array}{r} 481 \\ - 185 \\ \hline \end{array}$$
 check

Do you remember?



Write the name of each figure.





4.03.01 SUBTRACTION OF 4-DIGIT NUMBERS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

- *4.03.01.01A estimate differences by rounding minuends and subtrahends to the nearest thousand; e.g.,

9,246	minuend rounds to	9,000
<u>-3,125</u>	subtrahend rounds to	<u>-3,000</u>
		6,000

6,000 is the estimated difference.

- *4.03.01.02A subtract two 4-digit numbers without regrouping (exchange) and check; e.g.,

	<u>check</u>		<u>check</u>
5845	2413	\$49.39	\$37.24
<u>-3432</u>	<u>+3432</u>	<u>-12.15</u>	<u>+12.15</u>
2413	5845	\$37.24	\$49.39

- 4.03.01.03A subtract two 4-digit numbers with one or more regroupings (exchanges) and check; e.g.,

	<u>check</u>		<u>check</u>
^{3 15} 58 ~~45~~	¹ 2407	^{6 12 11} \$27. ~~37~~	¹ \$14.46
<u>-3438</u>	<u>+3438</u>	<u>-12.85</u>	<u>+12.85</u>
2407	5845	\$14.46	\$27.31

4.03.01.04A

compute subtraction examples having minuends with multiples of 100 or 1,000 and check; e.g.,

$$\begin{array}{r} 49 \\ 3100 \\ -2346 \\ \hline 1654 \end{array}$$

$$\begin{array}{r} \text{check} \\ 1654 \\ +2346 \\ \hline 4000 \end{array}$$

$$\begin{array}{r} 99 \\ 010.00 \\ -5.85 \\ \hline \$4.15 \end{array}$$

$$\begin{array}{r} \text{check} \\ \$4.15 \\ +5.85 \\ \hline \$10.00 \end{array}$$

4.03.01.05A

solve word problems related to skills learned in this module. e.g.,

A plane was flying 5,221 miles to Hawaii. It landed in Los Angeles after flying 3,138 miles. How many more miles will it fly to reach its destination?

4.03.01

VOCABULARY

TERMS

estimation
minuend
subtrahend
difference

GETTING STARTED 1:

Prepare nine cards from 100 through 900 counting by hundreds and slips of paper (one per student) with a number between 101 and 949 written on each. Distribute the slips of paper to each student. Ask nine students to stand at the front of the room, each displaying a hundreds cards. Say, "At which place must we look when rounding to the nearest hundred?" (When rounding to the nearest hundred we look at the tens place. When the tens place is less than 5, we round down and when it is 5 or more, we round up.) Ask each student who is holding a slip of paper to round his/her number to the nearest hundred and give his/her paper to the student holding the hundreds card to which that number rounds. When all the students have had a turn, ask each student holding a hundreds card to say the hundred he/she is holding and each of the numbers which were rounded to that hundred. Say, "Explain why each of those numbers was rounded to the hundred you are displaying." e.g.,

500

483

With an 8 in the tens place,
483 rounded to the nearest
hundred is 500.

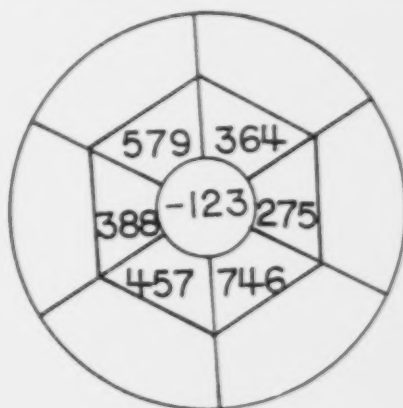
513

With a 1 in the tens place,
513 rounded to the nearest
hundred is 500.

GETTING STARTED 2:

Draw a number wheel on the chalkboard.

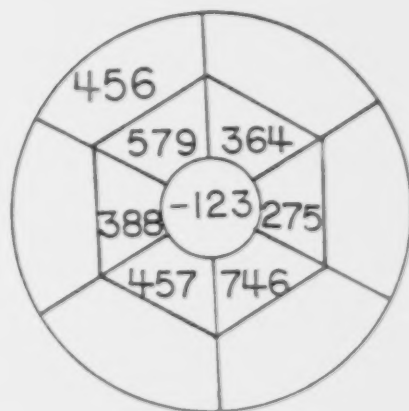
e.g.,



Say, "In order to complete this number wheel, subtract the middle number, 123, from each of the numbers around the center and write the answer in the empty spaces."

e.g.,

$$\begin{array}{r} 579 \\ -123 \\ \hline 456 \end{array}$$



Continue this procedure until 123 is subtracted from each number around the center and the wheel is complete.

Repeat this procedure with subtraction of two 3-digit numbers with regrouping.

4.03.01

4.03.01.01 estimate differences by rounding minuends and subtrahends to the nearest thousand

STRATEGY 1: Say, "An airline company needed to know which of its pilots flew the greatest number of miles during the past year. The company also needed to know approximately how many more miles each of their top pilots flew when compared to each other. The data showed that Captain Red flew 6,452 miles, Captain White flew 5,207 miles, and Captain Blue flew 6,876 miles. How shall we begin? (We can begin by comparing Captain Red's mileage with that of Captain White.) How would we compare their mileage if we had to find the exact difference? (We would subtract Captain White's mileage from that of Captain Red.) Since this problem asks us to find the approximate number of miles, rather than the exact number of miles, we will estimate the difference in mileage. How can we do this? (We can round each amount to the nearest thousand and compare the rounded amounts by subtracting.) When we subtract the rounded numbers, we will have an estimate of the difference. We will know approximately how many more miles Captain Red flew than Captain White."

Ask a student to write on the chalkboard: Captain Red flew 6,452 miles. Say, "When we round to the nearest thousand, at which place must we look? (We must look at the hundreds place when rounding to the nearest thousand.) With a 4 in the hundreds place, will we round up to the higher thousand or down to the lower thousand? (We will round down to the lower thousand.) To what thousand does 6,452 round?" (6,452 rounds to 6,000.) On the chalkboard write 6,452 rounds to 6,000.

Ask a student to write on the chalkboard: Captain White flew 5,207 miles. Say, "To what thousand do we

4.03.01

STRATEGY 1: round 5,207? Why?" (5,207 rounds to 5,000 because the number in the hundreds place is less than 5.) On the chalkboard write:

6,452 rounded to the nearest thousand is 6,000
5,207 rounded to the nearest thousand is 5,000

Say, "How can we find out approximately how many more miles Captain Red flew than Captain White?" (We can subtract the rounded numbers.) Ask a student to write a subtraction symbol in the appropriate place. Say, "We can estimate the difference by subtracting the rounded numbers. About how many more miles did Captain Red fly than Captain White?" (Captain Red flew about 1,000 miles more.) On the chalkboard write:

6,452 rounds to 6,000
- 5,207 rounds to 5,000
1,000 estimated difference

Ask the students to write it in their notebooks.

Repeat this procedure, comparing Captain Red's mileage to that of Captain Blue. When this has been completed, say, "Who flew the greatest number of miles? (Captain Blue flew the greatest number of miles.) How did rounding numbers help us? (When we rounded the numbers, we were able to estimate about how many more miles Captain Blue flew than the other pilots.) Do we need pencil and paper to estimate the differences?" (No. By rounding the numbers, we can estimate the differences in our heads.)

Repeat this procedure using other 4-digit numbers.

4.03.01.02 subtract two 4-digit numbers without regrouping (exchange) and check

STRATEGY 1: Demonstrate as you say, "Fold your notebook page into 4 columns." Write a 4-digit number on the chalkboard, e.g. 2,743. Point to the 3 and say,

4.03.01

STRATEGY 1: "What value does the 3 have in this number? (The 3 has a value of 3 ones.) Label the first column ones and write a 3 in that column. What value does the 4 have? (The 4 has a value of 4 tens.) What value does the 7 have? (The 7 has a value of 7 hundreds.) What value does the 2 have? (The 2 has a value of 2 thousands.) Label each column and write the corresponding number in each column."

e.g.,

Thousands	Hundreds	Tens	Ones
2	7	4	3

On the chalkboard, write the number 1,642 below 2,743. Ask the students to tell the value of each digit in 1,642 and to write each digit in the appropriate column on the place value chart.

Say, "We will subtract 1,642 from 2,743. Write a minus symbol in front of the number 1,642 and a horizontal line beneath it."

e.g.,

Thousands	Hundreds	Tens	Ones
2	7	4	3
- 1	6	4	2

Say, "Before we subtract, how can we estimate to find out about what the difference will be? (We can round the minuend and the subtrahend to the nearest thousand and subtract the rounded numbers in our heads.) What is 2,743 rounded to the nearest thousand? (2,743 rounded to the nearest thousand is 3,000.) What is 1,642 rounded to the nearest thousand? (1,642 rounded to the nearest thousand is 2,000.) How much is 3,000 minus 2,000?" (3,000 minus 2,000 equals 1,000.) On the chalkboard write:

$$\begin{array}{r}
 2,743 \text{ rounded to the nearest thousand is } 3,000 \\
 - \underline{1,642 \text{ rounded to the nearest thousand is } 2,000} \\
 \text{estimated difference} = 1,000
 \end{array}$$

4.03.01

STRATEGY 1: Ask a student to complete the subtraction at the chalkboard as the other students complete it in their notebooks. Say, "What is the difference? (The difference is 1,101.) The actual difference is reasonable if it comes fairly close to the estimated difference. How does the actual difference compare to our estimated difference? (The actual difference seems reasonable because it is close to the estimated difference.) How can we check to see if our answer is correct?" (We can check our answer by adding 1,101 to 1,642 to see if the total is 2,743.) Ask a student to check the example at the chalkboard as the other students use the reverse side of their papers to check.

Repeat this procedure using other 4-digit numbers which can be subtracted without regrouping.

STRATEGY 2: Prepare and display a subtraction example on the chalkboard.

e.g.,

$$\begin{array}{r} 3,598 \\ -1,276 \\ \hline \end{array}$$

Ask a student to read the example aloud. Say, "Before we solve this example, we will estimate the difference. How do we do this?" (We estimate the difference by rounding the minuend and subtrahend to the nearest thousand and subtracting the rounded numbers.) Ask a student to write the rounded numbers on the chalkboard and show the estimated difference.

e.g.,

$$\begin{array}{r} 3,598 \text{ rounded to the nearest thousand is } 4,000 \\ -1,276 \text{ rounded to the nearest thousand is } \underline{1,000} \\ \hline 3,000 \text{ estimated difference} \end{array}$$

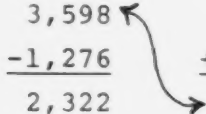
Say, "What is the estimated difference?" (The estimated difference is 3,000.)

4.03.01

STRATEGY 2: Ask another student to subtract the actual example as the other students work at their seats. Say, "What is the actual difference? (The difference is 2,322.) How do you know this is a reasonable answer? (We can check its reasonableness by comparing it to our estimate.) How can we check our answer? (We can add the difference, 2,322, to the subtrahend, 1,276.) How much is 2,322 and 1,276?" (The sum of the checked example is the same as the minuend in the original example, 3,598. Since they are the same, our answer is correct.)

e.g.,

	<u>check</u>
3,598	2,322
<u>-1,276</u>	<u>+1,276</u>
2,322	3,598



Repeat this procedure with similar examples, asking the students to solve and check them in their notebooks.

4.03.01.03 subtract two 4-digit numbers with one or more regroupings (exchanges) and check

STRATEGY 1: Adapt Strategy 1, P.O. 4.14.04.02 (page 14S.3) for use with 4-digit numbers involving regrouping (exchange).

STRATEGY 2: Adapt Strategy 2, P.O. 4.14.04.02 (page 14S.4) for use with 4-digit numbers involving regrouping (exchange).

4.03.01.04 compute subtraction examples having minuends with multiples of 100 or 1,000 and check

STRATEGY 1: Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Say, "Show 500 using your squared material. How did you represent 500 with the squared material? (I used 5 hundreds, 0 tens and 0 ones.) We will subtract 236

4.03.01

STRATEGY 1: from 500." Ask a student to write the example on the chalkboard.

cont'd

e.g.,

500

-236

Say, "In which column do we begin subtracting? (We begin in the ones column.) Can we subtract 6 ones from 0 ones? (No.) Why not? (Zero is less than six.) Usually we go to the next place to the left and regroup. Why can't we regroup the tens in this example? (We cannot regroup the tens because there are no tens.) When this happens, we go to the next place to the left where there is a number greater than zero. In which place is there a number greater than zero so that we can regroup? (The hundreds place has a number greater than zero so we can regroup.) How many hundreds do you have? (We have 5 hundreds.) Using your squared material, exchange 1 hundred for 10 tens. Now how many hundreds do you have? (We have 4 hundreds.) How many tens do you have? (We have 10 tens.) Can we begin to subtract now? (No, we still don't have any ones.) We have exchanged 1 hundred for 10 tens. Now we can exchange 1 ten for 10 ones. Use your squared material to show this exchange." After the students perform the exchange say, "How many tens do you have now? (We have 9 tens.) How many ones do you have? (We have 10 ones.) Can we now subtract?" (Yes, we have a greater amount of hundreds, tens, and ones than we need to take away. Therefore, we can subtract.)

Ask the students to use their squared material to complete the subtraction. Say, "What is the difference?" (The difference is 264.) At the chalkboard, demonstrate how to write about the exchanges that were made. Ask the students to explain each exchange as it is made at the chalkboard.

4.03.01

STRATEGY 1:

cont'd

$$\begin{array}{r} \text{e.g., } \begin{array}{r} 9 \\ 4 \cancel{10} 10 \\ 500 \\ -236 \\ \hline \end{array} \end{array}$$

Ask a student to complete the example at the chalkboard and check it using addition.

$$\begin{array}{r} \text{e.g., } \begin{array}{r} 9 \\ 4 \cancel{10} 10 \\ 500 \\ -236 \\ \hline 264 \end{array} \quad \begin{array}{r} \text{check} \\ \begin{array}{r} 1 \quad 1 \\ 264 \\ +236 \\ \hline 500 \end{array} \end{array}$$

Say, "How did we regroup so we would be able to subtract?" (We regrouped 500 as 4 hundreds, 9 tens and 10 ones.)

Repeat this procedure with other examples having minuends that are multiples of 100 and 1,000.

STRATEGY 2:

Prepare and display a place value chart through hundreds on the chalkboard. Ask a student to write 700 on the place value chart. Ask another student to write 358 on the place value chart below 700. Place a minus symbol next to 358.

e.g.,

Hundreds	Tens	Ones
7	0	0
- 3	5	8

Say, "Do we need to exchange in order to subtract 358 from 700? How do you know? (Exchange is needed because we cannot subtract 8 ones from 0 ones.)

Usually, we go to the tens and exchange 1 ten for 10 ones. Why can't we do that here? (There are no tens.) How can we get some tens?" (We can exchange 1 hundred for 10 tens.) Ask a student to show this exchange at the chalkboard.

e.g.,

Hundreds	Tens	Ones
6	10	0
7	0	0
- 3	5	8

4.03.01

STRATEGY 2: Say, "Now that we have 10 tens, how can we get ones?"
 cont'd (We can exchange 1 ten for 10 ones.) Ask a student
 to show the exchange on the place value chart.
 e.g.,

Hundreds	Tens	Ones
$\begin{array}{r} 6 \\ 7 \\ - 3 \end{array}$	$\begin{array}{r} 10 \\ 5 \end{array}$	$\begin{array}{r} 10 \\ 8 \end{array}$

Say, "Now we can subtract." Ask a student to complete the subtraction on the place value chart while the other students solve it in their notebooks. Say, "What is the difference?" (The difference is 342.) Ask the students to check the example using addition.

Say, "What did we do when we needed to exchange a ten for 10 ones and there were no tens?" (We exchanged 1 hundred for 10 tens, then we exchanged 1 ten for 10 ones.)

Repeat this procedure with other examples having minuends that are multiples of 100 and 1,000.

4.03.01.05 solve word problems related to skills learned in this module

STRATEGY 1: Write a word problem on the chalkboard.
 e.g.,

Richard wanted to buy shoes. At Shoemart the shoes cost \$27.99. At Brown's shoe store they cost \$24.76. How much will Richard save by purchasing the shoes at Brown's Shoe Store?

Say, "How can we find out how much he will save? (We can find the difference between the two prices by subtracting the smaller value from the larger value.) Ask a student to write and solve the problem on the chalkboard while the other students solve the problem at their desks.

4.03.01

STRATEGY 1:
cont'd

Say, "What was the difference between the prices? (\$3.23 is the difference.) How did you find the difference? (We subtracted the smaller value from the larger value.) How can we check our answer?" (We can check our answer by adding the difference to the subtrahend. If the total is the same as the minuend, then our subtraction is correct.) Ask a student to check the example on the chalkboard while the other students check at their desks.

Repeat this procedure using other subtraction problems.

NOTE: When using worksheets 16b, 16c, 16d, and 16e, students should be encouraged to create a word problem related to the checking example. This will help reinforce the concept of inverse operations and increase verbalization in problem solving.

NAME: _____ CLASS: _____ DATE: _____

Estimate each difference by rounding to the nearest thousand.

- ① $6,720$ rounded to the nearest thousand is 7000
 $-5,479$ rounded to the nearest thousand is 5000
 estimated difference 2000

- ② $2,610$ rounded to the nearest thousand is _____
 $-1,216$ rounded to the nearest thousand is _____
 estimated difference _____

- ③ $7,612$ rounded to the nearest thousand is _____
 $-5,075$ rounded to the nearest thousand is _____
 estimated difference _____

- ④ During a twelve hour period, 8,216 cars traveled over the Brooklyn Bridge. 3,997 cars traveled over the Williamsburg Bridge. Approximately, how many more cars traveled over the Brooklyn Bridge than the Williamsburg Bridge?
 estimated difference _____

- ⑤ On the Fourth of July, 9,709 people visited the observation deck of the World Trade Center. 7,812 people visited the observation deck of the Empire State Building. Approximately how many fewer people visited the Empire State Building than the World Trade Center?
 estimated difference _____

Do you remember?

Write the standard form of each expanded number.

$$20,000 + 4,000 + 600 + 30 + 2 = \underline{\hspace{2cm}}$$

$$80,000 + 3,000 + 20 + 6 = \underline{\hspace{2cm}}$$

$$300,000 + 20,000 + 1,000 + 500 + 30 + 3 = \underline{\hspace{2cm}}$$

NAME: _____ CLASS: _____ DATE: _____

Solve and check.

① <u>check</u> $\begin{array}{r} 3,745 \\ -1,620 \\ \hline \end{array}$	② <u>check</u> $\begin{array}{r} 4,621 \\ -1,321 \\ \hline \end{array}$
③ <u>check</u> $\begin{array}{r} 6,984 \\ -2,473 \\ \hline \end{array}$	④ <u>check</u> $\begin{array}{r} \$86.15 \\ -14.03 \\ \hline \end{array}$
⑤ <u>check</u> $\begin{array}{r} 9,836 \\ -7,214 \\ \hline \end{array}$	⑥ <u>check</u> $\begin{array}{r} 2,844 \\ -1,234 \\ \hline \end{array}$
⑦ <u>check</u> $\begin{array}{r} \$66.39 \\ -55.24 \\ \hline \end{array}$	⑧ <u>check</u> $\begin{array}{r} 5,987 \\ -2,451 \\ \hline \end{array}$
⑨ <u>solve</u> <u>check</u> James earned \$27.68 last week and \$21.54 this week. How much more did he earn last week than this week?	
⑩ <u>solve</u> <u>check</u> Betty wants to buy a bicycle that costs \$35.99. She has saved \$12.68 so far. How much money does she still need to buy the bicycle?	

NAME: _____ CLASS: _____ DATE: _____

Solve and check.

① <u>check</u> $\begin{array}{r} \$43.15 \\ - 18.06 \\ \hline \end{array}$	② <u>check</u> $\begin{array}{r} 2,367 \\ - 1,198 \\ \hline \end{array}$
③ <u>check</u> $\begin{array}{r} 8,642 \\ - 7,218 \\ \hline \end{array}$	④ <u>check</u> $\begin{array}{r} \$28.95 \\ - 14.89 \\ \hline \end{array}$
⑤ <u>check</u> $\begin{array}{r} 3,564 \\ - 1,289 \\ \hline \end{array}$	⑥ <u>check</u> $\begin{array}{r} 7,403 \\ - 2,182 \\ \hline \end{array}$
⑦ <u>check</u> $\begin{array}{r} \$86.29 \\ - 46.78 \\ \hline \end{array}$	⑧ <u>check</u> $\begin{array}{r} \$77.36 \\ - 18.49 \\ \hline \end{array}$
⑨ The coat Mark would like to buy costs \$45.50. He has \$22.98. How much more does he need to buy the coat? <u>solve</u> <u>check</u>	
⑩ The Baker family drove 1,205 miles on their vacation. The Williams family drove 2,571 miles on their vacation. How many more miles did the Williams family drive? <u>solve</u> <u>check</u>	

NAME: _____ CLASS: _____ DATE: _____

Solve and check.

① <u>check</u> $\begin{array}{r} 300 \\ -143 \\ \hline \end{array}$	② <u>check</u> $\begin{array}{r} \$2.00 \\ -1.99 \\ \hline \end{array}$
③ <u>check</u> $\begin{array}{r} 700 \\ -248 \\ \hline \end{array}$	④ <u>check</u> $\begin{array}{r} 900 \\ -497 \\ \hline \end{array}$
⑤ <u>check</u> $\begin{array}{r} \$20.00 \\ -16.35 \\ \hline \end{array}$	⑥ <u>check</u> $\begin{array}{r} 8,000 \\ -2,474 \\ \hline \end{array}$
⑦ <u>check</u> $\begin{array}{r} 5,000 \\ -2,158 \\ \hline \end{array}$	⑧ <u>check</u> $\begin{array}{r} \$30.00 \\ -19.75 \\ \hline \end{array}$
⑨ <u>solve</u> <u>check</u> Bobby bought a book for \$3.95. He gave the clerk \$5.00. How much change will he receive?	
⑩ <u>solve</u> <u>check</u> Ms. Gomez bought a jacket marked \$20.00. The clerk gave her a discount of \$3.95. How much did Ms. Gomez pay for the jacket?	

SHARPENING YOUR SKILLS

Units 10, 11, 12, 13

Name: _____ Class: _____ Date: _____

1. Add.

$$\begin{array}{r} 532 \\ +367 \\ \hline \end{array}$$

- (a) 889 (c) 235
(b) 899 (d) Not Here

2. Find the sum.

$$\begin{array}{r} 26 \\ +18 \\ \hline \end{array}$$

- (e) 44 (g) 314
(f) 12 (h) Not Here

3. Add.

$$\begin{array}{r} 525 \\ +115 \\ \hline \end{array}$$

- (a) 630 (c) 410
(b) 640 (d) Not Here

4. Estimate the sum.

$$\begin{array}{r} 2,819 \\ +4,112 \\ \hline \end{array}$$

- (e) 2,000 (g) 7,000
(f) 5,000 (h) 8,000

5. $3,213 + 586 + 37 = \boxed{}$

- (a) 3,826 (c) 3,726
(b) 3,236 (d) 3,836

6. On Saturday 365 people attended the school play. On Sunday there were 218. How many people were there on both days?

_____ people

7. Fill in each $\boxed{}$.

$$\begin{array}{r} 6 5 \\ - 3 1 \\ \hline 4 5 \end{array}$$

8. Subtract and check.

$$\begin{array}{r} 724 \\ -317 \\ \hline \end{array}$$

9. Find the difference and check.

$$\begin{array}{r} 83 \\ -26 \\ \hline \end{array}$$

10. Estimate the difference.

$$\begin{array}{r} 8,935 \\ -4,224 \\ \hline \end{array}$$

- (e) 3,000 (g) 3,000
(f) 5,000 (h) Not Here

11. Find the difference and check.

$$\begin{array}{r} 8,000 \\ -3,726 \\ \hline \end{array}$$

12. 850 tickets were printed for the concert. If 625 were sold, how many tickets were not sold?

_____ tickets

Unit 14

4.06.01 ADDITION AND SUBTRACTION OF FRACTIONS
WITH COMMON DENOMINATORS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.06.01.01A

add fractions with common denominators;
e.g.,

$$\frac{1}{10} + \frac{3}{10} = \frac{4}{10}$$
$$\begin{array}{r} \frac{3}{5} \\ + \frac{1}{5} \\ \hline \frac{4}{5} \end{array}$$

4.06.01.02A

subtract fractions with common denominators;
e.g.,

$$\frac{5}{6} - \frac{1}{6} = \frac{4}{6}$$
$$\begin{array}{r} \frac{3}{5} \\ - \frac{1}{5} \\ \hline \frac{2}{5} \end{array}$$

4.06.01.03A

solve word problems related to skills
learned in this module.

e.g.,

Marsha bought $\frac{3}{5}$ yard of red
felt and $\frac{1}{5}$ yard of green felt.
How much felt did she buy in all?

VOCABULARYTERMS

fraction
 numerator
 denominator

GETTING STARTED 1:

Prepare and distribute paper squares, circles, or rectangles and scissors to each student or group of students. Say, "This square (circle, rectangle) represents 1 whole." Ask the students to fold the paper in half and cut along the fold. Say, "How many equal pieces of paper do you have? (I have two equal pieces.) How do you know they are equal? (One piece fits exactly on the other.) What fraction of the whole piece is each piece? (Each piece is $\frac{1}{2}$ of the whole.) Write $\frac{1}{2}$ on each piece. How many halves equal one whole? (2 halves equal one whole.) Which numeral is the denominator? (2 is the denominator.) What does the denominator tell us? (The denominator tells us into how many equal parts the whole is divided.) Which numeral is the numerator? (1 is the numerator.) What does the numerator tell us?" (The numerator tells us how many of the parts of the whole we are talking about.) On the chalkboard write: $\frac{2}{2} = 1$ whole.

Repeat this procedure for thirds, fourths, sixths, and eighths.

Note: The students should save these fractional parts as they will be used in several strategies in this module.

GETTING STARTED 2:

Prepare and display a set of five circles on the chalkboard. Divide each into either halves, thirds, fourths, sixths, or eighths. Shade a fraction of each circle.

e.g.,



4.06.01

GETTING STARTED 2: cont'd

Say, "Into how many equal parts has this circle been divided? (It has been divided into 6 equal parts.) What can we call each part? (Each part is called one sixth of the circle.) How many sixths are shaded?" (4 sixths are shaded.) Ask a student to write the fraction for the shaded parts on the chalkboard. Ask another student to name the part that is not shaded and write that fraction on the chalkboard. Say, "In $\frac{4}{6}$ which number is the denominator? (6 is the denominator.) Which number is the numerator? (4 is the numerator.) What does the denominator tell us? (The denominator tells us the number of equal parts into which the whole has been divided.) What does the numerator tell us?" (The numerator tells us how many of those parts we are talking about.)

Repeat this procedure using the remaining circles.

4.06.01

4.06.01.01 add fractions with common denominators

STRATEGY 1: Using the fractional parts made in Getting Started 1 say, "Place the circle (square, rectangle) which you cut into fourths on the desk in front of you."

e.g.,



Say, "What fractional part of the whole circle does each piece represent? (Each piece is one fourth of the whole circle.) Label each piece $\frac{1}{4}$. Place two pieces on the side. What fraction of the whole circle do you have in front of you? (I have two fourths of the whole circle.) Add one more fourth to the two fourths you have. What fraction of the whole circle do you have now? (Now I have three fourths of the circle.) We can show this addition using a number sentence." On the chalkboard write $\frac{2}{4} + \frac{1}{4} = \frac{2+1}{4} = \frac{3}{4}$.

Say, "Which part of the fractions stayed the same in the sum? (The denominator in the sum stayed the same.) Why do you think the denominator stayed the same? (It stayed the same because we are still talking about fourths.) How did we find the numerator for the sum?" (We added the numerators of each fraction.)

Repeat this procedure using other paper squares or rectangles to add fractions horizontally and vertically. Say, "How do we add fractions with the same denominator?" (To add fractions with the same denominators, we add the numerators and keep the same denominator.) On the chalkboard write:

Adding Fractions With Like Denominators

1. Keep the same denominator.
2. Add the numerators.

STRATEGY 2: Prepare a group of examples showing addition of fractions with common denominators. Write one of the examples on the chalkboard along with a circle cut into the fractional parts equal to the numeral in the denominator.

e.g.,

$$\frac{1}{6} + \frac{4}{6} = \square$$



Ask a student to label each part of the circle as $\frac{1}{6}$. Ask another student to shade one part of the circle. Say, "How much of the circle is shaded?" (One sixth of the circle is shaded). Ask another student to shade four sixths more. Say, "How much of the circle is shaded now?" (Five sixths of the circle are shaded now.)

e.g.,



Pointing to the addition sentence say, "First we shaded one sixth and then we shaded four sixths more. What can we say about the sum of one sixth and four sixths?" (One sixth plus four sixths equals five sixths.) Ask a student to write the sum for one sixth plus four sixths in the box in the number sentence.

e.g.,

$$\frac{1}{6} + \frac{4}{6} = \square$$

Say, "What part of the fraction remained the same? (The denominator remained the same.) Why? (We did not change the size of the pieces. They are still sixths.) Which part changed?" (The numerator changed because we added two different amounts of sixths.) Write on the chalkboard and say, "When we add fractions with the same denominator, we add the numerators and keep the denominator the same." Ask

4.06.01

STRATEGY 2: the students to write this in their notebooks.
cont'd Demonstrate that the answer remains the same when the example is written vertically.

e.g.,

$$\begin{array}{r} \frac{1}{6} \\ \frac{4}{6} \\ + \frac{6}{6} \\ \hline \frac{5}{6} \end{array}$$

Repeat this procedure using several examples until the students can generalize that, when adding fractions with the same denominators, we add the numerators while the denominator remains the same.

4.06.01.02 subtract fractions with common denominators

STRATEGY 1: Adapt Strategy 1, P.O. 4.06.01.01 for use with subtraction of fractions with common denominators. Differences may be checked using addition.

STRATEGY 2: Adapt Strategy 2, P.O. 4.06.01.01 for use with subtraction of fractions with common denominators. Differences may be checked using addition.

4.06.01.03 solve word problems related to skills learned in this module

STRATEGY 1: Distribute the paper circles (squares, rectangles) cut into fractional parts in Getting Started 1. Write a word problem on the chalkboard.

e.g.,

Neil cuts a pizza into 8 equal slices. He eats 2 slices and gives 3 slices to Fred. What fractional part of the pizza was eaten by the two boys?

Say, "Which of our paper fractional parts should we use to illustrate this problem?" (We should use

4.06.01

STRATEGY 1: the paper squares (rectangles) cut into eighths.)
 cont'd Why is that better to use than the others? (Our problem is about a pizza cut into eighths.) What part of the pizza was eaten by Neil? (Neil ate 2 out of 8 pieces or $\frac{2}{8}$ of the pizza.) What part of the pizza was eaten by Fred? (Fred ate 3 out of 8 pieces or $\frac{3}{8}$ of the pizza.) How can we solve the problem? (We can solve the problem by adding $\frac{2}{8}$ and $\frac{3}{8}$.) Why?" (We will add because we want to find the amount of pizza eaten by both boys together.) Ask the students to solve the problem using the fractional parts. Ask one student to explain the procedure needed to solve the problem and write the steps needed on the chalkboard in horizontal format while another student writes it in vertical format.

e.g.,

$$\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$$

$$\begin{array}{r} \frac{2}{8} \\ + \frac{3}{8} \\ \hline \frac{5}{8} \end{array}$$

Say, "How many pieces of pie were eaten? (Five pieces were eaten.) What fractional part of the pie was eaten? (Five eighths of the pie were eaten.) Why did you use addition to solve the problem?" (We were asked to find what fractional part of the pie was eaten by both boys.)

Repeat this procedure with other word problems for both addition and subtraction of fractions with common denominators.

STRATEGY 2: Prepare a group of word problems involving addition or subtraction of fractions with common denominators.

e.g.,

David ran $\frac{1}{3}$ mile on Friday. He ran another $\frac{1}{3}$ mile on Saturday. How far did he run both days?

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STRATEGY 2:

cont'd

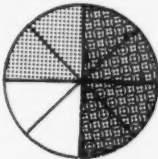
Say, "What operation would you use to solve this problem? (I would use addition.) Why?" (We want to find how far David ran both days.) Ask the students to write a number sentence and solve it to find the answer to the problem.

Repeat the procedure for other addition or subtraction problems. Say, "What part of the fraction remains the same when we add or subtract fractions with common denominators? (The denominator remains the same because we haven't changed the number of pieces into which the whole was divided.) Which part of the fractions do we add or subtract?" (The numerators are the numbers we add or subtract.)

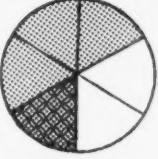
NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

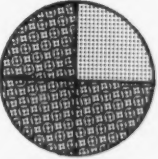
Write two addition sentences for each picture to show how many parts are shaded in all.

$$\frac{2}{8} + \frac{4}{8} = \frac{6}{8} =$$


$$= \frac{4}{8} + \frac{2}{8} = \frac{6}{8}$$

$$\frac{\quad}{\quad} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$$


$$\frac{\quad}{\quad} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

$$\frac{\quad}{\quad} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$$


$$\frac{\quad}{\quad} + \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Find the sum.

$\frac{5}{6}$	$\frac{3}{8}$	$\frac{1}{3}$	$\frac{5}{9}$	$\frac{1}{12}$	$\frac{2}{11}$
$+\frac{1}{6}$	$+\frac{4}{8}$	$+\frac{1}{3}$	$+\frac{2}{9}$	$+\frac{7}{12}$	$+\frac{5}{11}$

$$\frac{4}{5} + \frac{1}{5} = \square \quad \frac{4}{8} + \frac{4}{8} = \square \quad \frac{1}{6} + \frac{1}{6} = \square$$

$$\frac{4}{12} + \frac{3}{12} = \square \quad \frac{6}{10} + \frac{2}{10} = \square \quad \frac{3}{4} + \frac{0}{4} = \square$$

Do you remember?

3,667 rounded to the nearest thousand is _____

7,198 rounded to the nearest thousand is _____

32,443 rounded to the nearest thousand is _____

NAME: _____ CLASS: _____ DATE: _____

Play Fraction Subtraction to solve the puzzle. Solve each fraction example. Write the letter for each fractional difference on the lines provided.

What did the inspector call the case when Fiddle II was missing?



I.



II.



III.

The of the !

$\frac{6}{7}$ $\frac{3}{10}$ $\frac{2}{8}$ $\frac{2}{8}$ $\frac{1}{6}$ $\frac{1}{2}$ $\frac{2}{9}$ $\frac{3}{10}$ $\frac{2}{8}$ $\frac{2}{8}$ $\frac{1}{6}$ $\frac{1}{2}$ $\frac{2}{4}$ $\frac{3}{10}$ $\frac{2}{8}$ $\frac{2}{8}$ $\frac{1}{6}$ $\frac{1}{2}$

$$\frac{5}{8} - \frac{3}{8} = \boxed{}$$

D

$$\frac{4}{9} - \frac{2}{9} = \boxed{}$$

M

$$\frac{6}{6} - \frac{5}{6} = \boxed{}$$

L

$$\frac{9}{10} - \frac{6}{10} = \boxed{}$$

I

$$\frac{2}{2} - \frac{1}{2} = \boxed{}$$

E

$$\frac{7}{7} - \frac{1}{7} = \boxed{}$$

R

$$\frac{3}{4} - \frac{1}{4} = \boxed{}$$

F

CHALLENGE!

How many halves are there in 5 wholes? _____ halves

How many thirds are there in 5 wholes? _____ thirds

How many fifths are there in 5 wholes? _____ fifths

NAME: _____ CLASS: _____ DATE: _____

Read each problem. Write a number sentence to help solve the problem.
Check your answers.

- ① Gordon plants corn in $\frac{3}{8}$ of his garden. He plants cucumbers in $\frac{2}{8}$ of his garden. How much of his garden has he used?

Gordon has used _____ of his garden.

- ② Howard cut a pizza into 8 equal slices. He ate two slices and Jenny ate one. What fractional part of the pie was eaten?

_____ of the pie was eaten.

- ③ Paul needed $\frac{3}{4}$ cup of sugar to bake a dozen cookies. He only had $\frac{2}{4}$ cup of sugar in his cupboard. How much more sugar did he need?

Paul needed _____ cup more sugar.

- ④ Ms. Stone bought $\frac{5}{6}$ yard of material. She used $\frac{1}{6}$ yard to make an apron. How much material did she have left over?

Ms. Stone had _____ yard left over.

CHALLENGE!

Betty was painting ten lamps. She painted three of them blue and four of them red. What fractional part of the ten lamps were still left for Betty to paint?

4.11.01 OPEN SENTENCES

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*4.11.01.01A

identify an open sentence as a number sentence
in which a letter or frame is used in place of
a number;

e.g.,

$$10 + y = 15 \quad \text{open sentence}$$

$$185 - \square = 140 \quad \text{open sentence}$$

$$2 + 5 = 7 \quad \text{not an open sentence}$$

4.11.01.02A

solve an open sentence;

e.g.,

$$735 - N = 187$$

4.11.01.03B

using the information from a given table, write
the open sentence that could be used to find
the missing information.

e.g.,

$\square$	$\triangle$
10	7
11	8
12	

$$\triangle + 3 = 12$$

$$12 - \triangle = 3$$

$$12 - 3 = \triangle$$

$$\square - \triangle = 3$$

$$\triangle + 3 = \square$$

4.11.01

VOCABULARY

TERMS

open sentence

GETTING STARTED 1:

Prepare a set of cards with an incomplete sentence written on each card.

e.g.,

Jill went up the _____.

Ask a student to fill in the blank with a word which would make sense in the sentence. Say, "What did you do to complete the sentence? (We filled in the missing word.) What word did you use? (Accept any reasonable response, e.g., hill, stairs, mountain.) What other words would make sense?"

Continue this procedure until all of the cards have been used.

Say, "When we fill in a blank in a sentence, many words can be used to complete the sentence."

GETTING STARTED 2:

Prepare several numerical sequences. Write each sequence on the chalkboard with some of the numbers replaced by a frame.

e.g.,

1, 2, 3, , 5, , 7, 8, 9,

2, , , 8, , 12, 14, , 18, 20

Say, "Look at the first number sequence. What do the frames represent? (The frames represent missing numbers in the sequence.) How are we counting in the first number sequence? (We are counting by ones.) How do you know?" (2 is one more than 1, 3 is one more than 2.) Ask several students to write the missing numbers in the frames.

Repeat this procedure with the other number sequences.

4.11.01

4.11.01.01 identify an open sentence as a number sentence in which a letter or frame is used in place of a number

STRATEGY 1: Prepare a set of number cards and several letter cards with some cards left blank. Using the cards, display an addition sentence.

e.g.,

$$\boxed{2} + \boxed{3} = \boxed{5}$$

Ask a student to read the sentence. Say, "What do we have to find to complete this number sentence?" (There is nothing to find.)

Ask a student to replace any of the numbers with a blank card.

e.g.,

$$\boxed{2} + \boxed{} = \boxed{5}$$

Say, "Now this is an open sentence. How is this different from the first sentence? (It is different because a number is missing.) Why do you think we call it an open sentence?" (We call it an open sentence because there is something missing, it is not complete.)

Use the number cards to demonstrate that we can place the blank card anywhere in the sentence to make an open sentence. Say, "Sometimes a letter is used instead of a blank. It is still called an open sentence."

e.g.,

$$\boxed{7} + \boxed{y} = \boxed{10}$$

Say, "Why is the letter y in our number sentence? (The y takes the place of the missing number.) What other letter might we use?" (We can use any letter.) Ask several students to use the number cards to make addition and subtraction number sentences. Ask several other students to use the blank cards or the letter cards to change these number sentences to open sentences.

4.11.01

4.11.01.02 solve an open sentence

STRATEGY 1: Write an open number sentence on the chalkboard, e.g., $46 - \square = 12$. Say, "How do we know something is missing in this sentence? (A frame or letter in a number sentence means something is missing.) We can determine how to solve this open sentence by using easier numbers." On the chalkboard write $5 - \square = 4$. Say, "How is this open number sentence like our first open number sentence? (They are alike because they are both subtraction sentences with missing subtrahends.) In the original number sentence the minuend is greater than the difference and this is also true in the open sentence with easier numbers. What number belongs in the box in the easier number sentence?" (1 belongs in the box because 5 minus 1 equals 4.) Ask a student to write 1 in the box on the chalkboard.

Say, "What operation could you use with the numbers 5 and 4 to get 1? (I could subtract 4 from 5.) Since that operation works with our easier numbers, it will work with the more difficult numbers, too. What shall we subtract in our original open number sentence?" (We will subtract 12 from 46.) Ask a student to perform the subtraction at the chalkboard.

Say, "What number belongs in the box? (34 belongs in the box.) How can you be sure that 34 is correct?" (One way is to write 34 in the box, subtract it from 46, and see if the difference is 12.) Ask a student to check the answer at the chalkboard. Say, "How else could we check our answer?" (We could add 12 plus 34 to see if the sum is 36.)

Repeat this procedure with other open number sentences.

STRATEGY 2: Write an open number sentence on the chalkboard. e.g.,

$$8 - 3 = \square$$

182

4.11.01

STRATEGY 2: cont'd

Say, "When we subtract, how do we check our answer? (We check the answer by adding the difference to the subtrahend.) We can also use addition to solve the open sentence $\square - 3 = 5$. If the minuend is missing, we add $5 + 3$ and our answer is 8. We know the missing number is 8." We can check by subtracting 3 from 8 to see if the difference is 5." Write a more difficult number sentence on the chalkboard.

e.g.,

$$75 + x = 110$$

Say, "Just as we used addition to solve an open sentence with a missing minuend, we can use subtraction to solve an open number sentence with a missing addend. If we know that 75 plus some number, x , equals 110, how can we find x ? (We can subtract 75 from 110. The difference will be the number x represents.) Subtract 75 from 110. See if your answer is reasonable." Ask a student to write his/her answer on the chalkboard and check it.

e.g.,

$$\begin{array}{r} 75 + x = 110 \\ x = 35 \\ \text{check: } 75 + 35 = 110 \end{array}$$

$$\begin{array}{r} 110 \\ -75 \\ \hline 35 \end{array}$$

Say, "What operation do we use to find a missing addend? (We use subtraction.) To find a missing minuend in a subtraction example, we add. To find a missing subtrahend in a subtraction example, we will use subtraction." Demonstrate at the chalkboard.

e.g.,

$$\begin{array}{r} 25 - x = 15 \\ x = 10 \\ \text{check: } 25 - 10 = 15 \end{array}$$

$$\begin{array}{r} 25 \\ -15 \\ \hline 10 \end{array}$$

4.11.01

STRATEGY 2: Say, "When we have 2 addends, how do we find the missing addend? (We find the missing addend by subtracting the remaining addend from the sum.) How do we find a missing subtrahend? (We find a missing subtrahend by subtracting the minuend from the difference.) How do we find a missing minuend?" (We find a missing minuend by adding the difference to the subtrahend.)

Repeat this procedure asking the students to solve other open sentences.

4.11.01.03 using the information from a given table, write the open sentence that could be used to find the missing information

STRATEGY 1: Prepare and distribute to each student a duplicated sheet with several number tables using frames or letters to represent missing numbers.

e.g.,

	
7	17
9	19
11	21
13	

or

A	B
1	3
2	6
3	9
4	B

Say, "Look at the first chart. Look at each number in the column on the left. Look across at the numbers in the second column. What patterns do you notice in this table? (Each number under the square or triangle is 2 more than the number above it. Each number under the triangle is 10 more than the number to its left under the square.) What do we have to find? (We have to find the number opposite 13.) Look at the numbers at the top of each column. What is the relationship between 7 and 17? (17 is 10 more than 7 and 7 is 10 less than 17.) Can you use two

4.11.01

STRATEGY 1:
cont'd

members of the number family to show the relationship?" (We can say $7 + 10 = 17$ or $17 - 10 = 7$.)

Repeat this procedure for each pair of numbers.

Say, "What open sentence can we use to find the number that belongs in the $\triangle$?" (We can use the sentence $13 + 10 = \triangle$.) Ask a student to write and solve the number sentence at the chalkboard. Say, "Does our answer, 23, fit with the relationships in the rest of the chart? (Yes. It is 10 more than 13.) Now, look back at the first column. What is the relationship between the 7, 9, 11, and 13? (Each one is 2 greater than the one before it.) What is the relationship between the numbers in the second column? (They also increase by 2.) If $17 + 2 = 19$, and $19 + 2 = 21$, what other open sentence can we use to find our answer? (We can use $21 + 2 = \triangle$.) We have seen several ways to solve our problem. We found patterns and relationships among the numbers in the table and we wrote and solved open addition sentences. What other methods could we have used?" (We could have used subtraction sentences.)

Repeat this procedure using the other number tables on the duplicated sheet.

NAME: _____ CLASS: _____ DATE: _____

Solve each open number sentence.

$6 + \square = 15$

$8 + 6 = \square$

$11 - 5 = \square$

$7 - 4 = \square$

$\square - 2 = 5$

$\square - 3 = 1$

$\square + 6 = 10$

$10 - \square = 9$

$6 + \square = 12$

$27 + n = 58$

$n = \underline{\hspace{2cm}}$

check: _____

$\square + 48 = 117$

$\square = \underline{\hspace{2cm}}$

check: _____

$62 - \square = 28$

$\square = \underline{\hspace{2cm}}$

check: _____

$\square - 42 = 53$

$\square = \underline{\hspace{2cm}}$

check: _____

$\square - 39 = 59$

$\square = \underline{\hspace{2cm}}$

check: _____

$146 + y = 258$

$y = \underline{\hspace{2cm}}$

check: _____

NAME: _____ CLASS: _____ DATE: _____

Write and solve an open number sentence to find the missing number in each table.

$\square$	$\triangle$
0	3
3	6
6	9
9	12
12	$\triangle$

$\square$	$\triangle$
2	4
3	6
4	8
5	10
6	$\triangle$

$\square$	$\triangle$
10	6
8	4
6	2
4	$\triangle$

$\square$	$\triangle$
12	6
8	4
4	2
2	$\triangle$

Do you remember?

Ted has 2 twenty dollar bills and 1 ten dollar bill. How much money does Ted have?

I have three bills that total \$20.00. Two of the bills have the same value. What are the bills?

4.13.02 PROBLEM SOLVING - USE NUMBER SENTENCES

TO SOLVE PROBLEMS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.13.02.01A

translate a one step word problem into an open number sentence and solve;
e.g.,

John is 160 cm tall. His friend is 148 cm tall. How much taller is John than his friend?

4.13.02.02A

choose and sequence operations to solve a two step word problem;
e.g.,

Sam baked one pan of 36 cookies and another pan of 48 cookies. Then he sold 55 cookies. How many cookies did he have left?

4.13.02.03B

create a word problem based upon a solution.
e.g.,

15 cm long

Suggestion:

Melvin bought a piece of wood that was 99 cm long. He needs 84 cm for the shelf in his bookcase. How much wood did Melvin have left after he made his shelf?

4.13.02

VOCABULARY

TERMS

operations
open number sentence

GETTING STARTED 1:

Prepare sets of chips and several Bingo cards, each having a different arrangement of symbols.

e.g.,

BINGO			
+	X	X	÷
-	÷	-	+
÷	+	-	+
-	+	X	÷

BINGO			
÷	-	÷	-
X	+	X	÷
+	-	÷	X
-	X	+	+

Divide the students into teams. Distribute one card and several markers to each team. Read a one step word problem to the students. Ask the students to determine the operation needed to solve the problem and tell why they chose that operation. A member of the team then places a marker on the symbol for the operation. The students may cover only one symbol at a time. The team that covers four symbols in a row vertically, horizontally, or diagonally says, "Bingo." That team wins the game.

GETTING STARTED 2:

Prepare a set of four cards, each having one of the four operation symbols on it.

e.g.,



Say, "I will display a card. Write a number sentence using the operation on the card." Display a card, e.g., x.

4.13.02

GETTING STARTED 2: (cont'd)

Ask a student to write his/her number sentence on the chalkboard.
e.g.,

$$6 \times 5 = 30$$

Say, "Is the number sentence correct? How can we check the answer?" (Accept any reasonable response.)

Repeat this procedure until each student has had a chance to respond.

4.13.02

4.13.02.01 translate a one step word problem into an open number sentence and solve

STRATEGY 1: Write a word problem on the chalkboard.

e.g.,

There were 23 circus posters on one wall.

There were 10 circus posters on another wall. How many posters were there in all?

Ask the students to read the problem silently as one student reads it aloud. After reading the problem ask a student to come to the chalkboard and underline the information necessary to solve the problem.

e.g.,

There were 23 circus posters on one wall.

There were 10 circus posters on another wall.

How many posters were there in all?

Say, "What operation should we use for this word problem? (We should use addition.) Why did you choose addition?" (We are putting things together to find a total. Therefore, we add.) Ask a student to use the underlined information to write an open sentence to solve this problem.

e.g.,

$$23 + 10 = \square \text{ circus posters}$$

Ask another student to complete the number sentence as the other students write the number sentence and solve it in their notebooks. Say, "How many posters were there in all? (There were 33 posters.) How can we check our addition?" (We can reverse the addends and add again.) Ask the students to check their addition.

Repeat this procedure for writing, solving, and checking open number sentences to solve problems.

4.13.02

4.13.02.02 choose and sequence operations to solve a two step word problem

STRATEGY 1: Prepare a stack of 6 books and a stack of 8 books. Label the stacks A and B respectively. Write a related word problem on the chalkboard.

e.g.,

Stack A is for class 4-2. Stack B is for class 4-1. Together, the classes need 21 books. How many more books do they need?

Say, "What must we find? (We must find out how many more books are needed.) To solve this problem, what must we do first? (We must add the 6 books in one stack to the 8 books in the other stack to see how many books we have.) What must we do next?" (We must subtract the total number of books from 21 to see how many books are still needed.) Ask a student to write the number sentence that is needed to solve the first part of the problem. Ask another student to complete the number sentence and label the answer.

e.g.,

Step 1: $6 + 8 = 14$ books in all

Ask another student to use the solution to the first number sentence to write and solve the second part of the problem.

e.g.,

Step 2: $21 - 14 = 7$ books needed.

Say, "What is the solution to the problem? (7 more books are needed.) How many steps did it take to solve this problem? (It took 2 steps.) How is this different from the previous lesson's problems? (Those problems were solved in one step.) How can we check our answer?" (We can add 7 and 14 to see

4.13.02

STRATEGY 1: if the sum is 21, which is the number of books
cont'd needed.) Ask a student to check the example at the
chalkboard.

Repeat this procedure using other two step problems.
Ask the students to write the story problems and to
write and solve the number sentences needed to solve
each problem in their notebooks.

4.13.02.03 create a word problem based upon a solution

STRATEGY 1: Prepare a group of possible solutions to problems.
Write one on the chalkboard, e.g., 24 cans of cat
food.

Say, "In other lessons we found solutions to word
problems. Now we will have a chance to create a
problem that, when solved, will have the answer 24
cans of cat food. Can you write a one step problem
that will result in this answer? Can you write a two
step problem for this answer? What operation(s) is
(are) needed to solve your problem?"

Help students discover that many problems can be
written using this one answer.

e.g.,

Tanya bought 14 cans of cat food last
week and 10 more cans this week. How
many cans of cat food did she buy in
all?

Sal bought 7 cans of cat food for each
of his 3 cats. Then he bought 3 more
cans. How many cans of cat food did he
buy in all?

Repeat this procedure for other solutions to
problems. As an extension, the students may create
the solutions and ask their classmates to create
the problem for that answer.

NAME: _____ CLASS: _____ DATE: _____

Write and solve a number sentence for each problem.

1. Freddie's fantastic donut machine makes 9 donuts in one minute. How many donuts can it make in 8 minutes?	2. Jerry picked 13 kg of apples at the class picnic. Joey picked 19 kg of apples. How many kilograms of apples did they pick in all?
3. Nancy had 65¢. She found a dime. How much money did she have then?	4. Ms. Green drove 145 miles last week and 98 miles this week. How many miles did she drive in all?
5. Sue can walk 30 blocks in an hour. Pete can walk 20 blocks in an hour. How many more blocks can Sue walk in one hour than Pete?	6. Janice has 45 pennies. If she makes stacks of 5 pennies each, how many stacks will she have?

Do you remember?

$$\begin{array}{r} 394 \\ + 142 \\ \hline \end{array}$$

check

$$\begin{array}{r} 672 \\ + 298 \\ \hline \end{array}$$

check

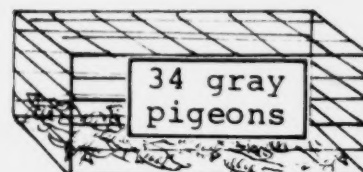
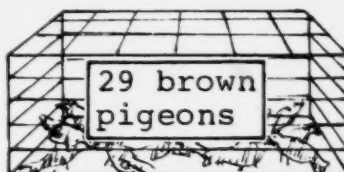
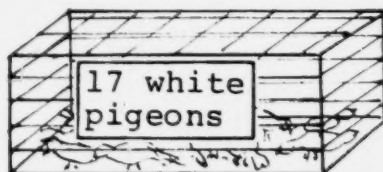
$$\begin{array}{r} 265 \\ + 745 \\ \hline \end{array}$$

check

NAME: _____ CLASS: _____ DATE: _____

Write and solve the number sentences needed for each problem.

Michael bought white pigeons in March, brown pigeons in April, and gray pigeons in May. Here are his coops.



1. How many more pigeons did Michael buy in March and April than he bought in May?

Think: Step 1 _____ Answer: _____
 Step 2 _____

2. Michael wants to have 100 pigeons by the end of June. How many more must he buy?

Think: Step 1 _____ Answer: _____
 Step 2 _____

3. If Michael trades all his white pigeons for 11 more brown ones, how many browns and grays will he have in all?

Think: Step 1 _____ Answer: _____
 Step 2 _____

4. If Michael buys 13 more gray pigeons and then sells 18 gray pigeons, how many gray pigeons will he have left?

Think: Step 1 _____ Answer: _____
 Step 2 _____

CHALLENGE!

Pamela has 7 nickels. She has twice as many dimes as nickels and 4 fewer pennies than dimes. How much money does Pamela have?

Pamela has _____.

NAME: _____ CLASS: _____ DATE: _____

Here are some answers. You will write the problems. Use your imagination. Write one step and two step problems.

1. Answer: 20 pages

Problem: _____

2. Answer: \$24.00

Problem: _____

3. Answer: 58 inches

Problem: _____

4. Answer: 40 miles

Problem: _____

5. Answer: 75 animals

Problem: _____

CHALLENGE!

There are 8 more oranges than bananas.
There are 2 more bananas than apples.
If there are 4 apples, how many
bananas and oranges are there?

_____ bananas

_____ oranges

SHARPENING YOUR SKILLS

Units 14, 15, 16

Name: _____

Class: _____

Date: _____

1. $\frac{7}{10} - \square = \frac{3}{10}$

(a) $\frac{4}{10}$

(c) $\frac{3}{10}$

(b) $\frac{10}{10}$

(d) Not Here

2. $\frac{3}{6} + \frac{2}{6} = \square$

(e) $\frac{1}{6}$

(g) $\frac{5}{12}$

(f) $\frac{5}{6}$

(h) Not Here

3. $17 + A = 41$
 $A = \square$

(a) 17

(c) 36

(b) 58

(d) 24

4. $32 - \square = 22$

(e) 1

(g) 10

(f) 12

(h) 54

5. $228 - Y = 175$
 $Y = \square$

(a) 28

(c) 403

(b) 153

(d) 53

6.

$\square$	$\triangle$
20	15
15	10
10	$\triangle$

Which number sentence could be used to find the number that belongs in the $\triangle$?

(e) $20 - 10 = \triangle$

(f) $10 - 5 = \triangle$

(g) $10 + 5 = \triangle$

(h) $20 - \triangle = 10$

7. The answer is 44 hot dogs. A problem that will have this answer is:

8. Nina walked $\frac{3}{8}$ mile. Then she walked $\frac{4}{8}$ mile. How far did she walk in all?

_____ mile

9. On Halloween night, Luis started trick or treating with 17 cents. When he finished, he had 91 cents. How much money did he get trick or treating?

Unit 17

4.14.05 REVIEW - MULTIPLICATION AND DIVISION FACTS

(1 lesson/ongoing)

PERFORMANCE OBJECTIVES

The student will be able to...

- 4.14.05.01 compute basic multiplication facts through
9 x 9;
e.g.,

$$\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array} \quad \text{or} \quad 3 \times 4 = 12$$

- 4.14.05.02 compute basic division facts through $81 \div 9$
and check;
e.g.,

$$\begin{array}{r} 8 \\ 3 \overline{)24} \end{array} \quad 24 \div 3 = 8$$

check
 $3 \times 8 = 24$

- 4.14.05.03 use the associative property of
multiplication.
e.g.,

$$\begin{array}{rclclcl} (2 \times 3) & \times & 3 & = & 2 & \times & (3 \times 3) \\ 6 & \times & 3 & = & 2 & \times & 9 \\ 18 & & & = & 18 & & \end{array}$$

VOCABULARYTERMSSYMBOLS

multiplication
facts
product

x
/
)

GETTING STARTED 1:

Prepare several cards with a different word problem on each card. Most of the cards should have multiplication word problems for basic multiplication facts. Some of the cards should have word problems for basic subtraction, addition, and division facts.

e.g.,

The goose laid 4 eggs every day this week. How many eggs did the goose lay this week?

Bob picked 7 roses and 9 daisies from his garden. How many flowers did Bob pick?

Display the cards on the chalk ledge. Say, "A word problem is written on each card. You will decide how to solve the problem and explain why you would solve it that way." Ask a student to read a problem aloud as the other students read it silently. Ask the students to determine how it should be solved and to explain why they selected that operation. If a student determines that a multiplication problem may be solved through repeated addition, accept that response. Lead the students to the understanding that multiplication is a process of repeated addition.

GETTING STARTED 2:

Adapt GETTING STARTED 1: However, most of the cards should have division word problems for basic division facts. If a student determines that a problem with a division solution may be solved through repeated subtraction, accept that response. Lead the students to the understanding that division may be seen as a process of repeated subtraction.

4.14.05

4.14.05.01 compute basic multiplication facts through 9 x 9

STRATEGY 1: Prepare and distribute an egg carton and 81 chips or beans to each group of students. Say, "Place 2 chips in one compartment of the egg carton. How much is 1 group of 2 chips?" (1 group of two equals 2.) Ask a student to write the multiplication fact for 1 group of two equals 2 on the chalkboard two different ways. e.g.,

$$1 \times 2 = 2 \qquad \begin{array}{r} 2 \\ \times 1 \\ \hline 2 \end{array}$$

Continue this procedure through 9 groups of two.

Repeat this procedure for computing other multiplication facts.

STRATEGY 2: Prepare and distribute a multiplication grid to each student.

e.g.,

x	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

Say, "The factors for the basic multiplication facts are along the top and the side of the grid. Place your finger on the factor 4 at the side of the chart. Place another finger on the factor 3 at the top of the chart. Move your fingers across from 4 and down

4.14.05

STRATEGY 2:

cont'd

from 3 until they meet. In the box where they meet write the product of 4×3 . What number did you write in the box?" (I wrote 12 in the box.) Ask the students to read the multiplication fact aloud. Say, "If you weren't sure of the product, how else could you have found it? (I could have added 4 groups of three to find the answer, 12.) Why does that method work? (Multiplication is a quick way of adding the same addend many times.)

Repeat this procedure with other multiplication facts until the chart is complete.

4.14.05.02

compute basic division facts through $81 \div 9$ and check

STRATEGY 1:

Prepare and distribute an egg carton and 81 chips or beans to each group of students. Say, "We will review division facts. Count out 18 chips. If you place groups of 6 chips in as many sections of the egg carton as you can, how many groups of 6 will you make? (I can place 6 chips in each of 3 sections. I made 3 groups of 6.) How many chips do you have in all? (I have 18 chips.) How many groups of 6 did you make? (I made 3 groups of 6.) What number sentence shows this division fact?" (18 divided by 6 equals 3.) Ask a student to write the division fact on the chalkboard two different ways.

e.g., $18 \div 6 = 3$ $\begin{array}{r} 3 \\ 6 \overline{)18} \end{array}$

Ask the students to record the number sentences in their notebooks. Say, "How is each number sentence read?" (Each number sentence is read 18 divided by 6 equals 3.) On the chalkboard write 18 divided by 6 equals 3 and ask students to record this in their notebooks under the number sentences.

Say, "We can check division by using multiplication. What is the related multiplication fact for 18

4.14.05

STRATEGY 1: divided by 6 equals 3?" (The related multiplication fact is 3 times 6 equals 18.) Write $3 \times 6 = 18$ on the chalkboard. Say, "Was our division correct? Why?" (Yes, our division was correct because $3 \times 6 = 18$. Therefore, $18 \div 6 = 3$.)

Repeat this procedure to review other division facts through $81 \div 9$.

STRATEGY 2: Prepare a cardboard or construction paper reverse L (┐) for each student. Distribute the completed multiplication chart constructed in P.O. 4.14.05.01, Strategy 2 and a reverse L (┐) to each student. Say, "We will review division facts. I have given you your multiplication chart and a marker. The marker looks like a reverse L. Find the number 24 in the column that begins with 6 and place the inside corner of your marker next to 24." e.g.,



X	0	1	2	3	4	5	6		9
0	0	0	0	0	0	0	0		0
1	0	1	2	3	4	5	6		9
2	0	2	4	6	8	10	12		18
3	0	3	6	9	12	15	18		27
4	0	4	8	12	16	20	24		36
									45
									54

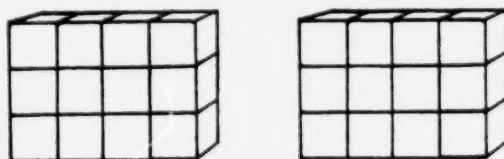
Say, "What division facts did you find?" (I found $24 \div 6 = 4$ and $24 \div 4 = 6$.) Ask a student to write these division facts on the chalkboard. Say, "How can we check a division example? (We can multiply the quotient by the divisor and, if the answer is the same as the dividend, we know that we have divided correctly.) Why does this work? (Multiplication is

4.14.05

STRATEGY 2: the inverse operation of division.) What multiplication facts can we use to check our division facts?" (We can use $4 \times 6 = 24$ and $6 \times 4 = 24$.) Repeat this procedure with other division facts.

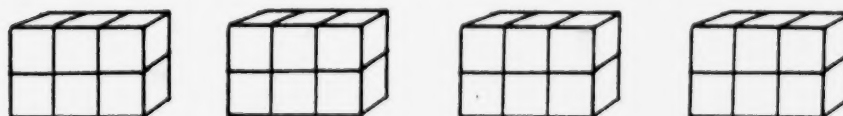
4.14.05.03 use the associative property of multiplication

STRATEGY 1: Prepare and display a demonstration set of interlocking cubes. Say, "We have seen how changing the order of two factors does not change the product. Now we are going to see if changing the grouping of three factors changes the product." Use the interlocking cubes to form two arrays, each having 3 rows and 4 columns.
e.g.,



Display one of the arrays and say, "What multiplication fact can we use to find the total number of cubes in this array?" (We can represent the total number of cubes with the multiplication fact 3×4 .) On the chalkboard write 3×4 . Place the second array on top of the first array. Say, "How many groups of 3×4 are there?" (There are 2 groups of 3×4 .) Below it write $2 \times (3 \times 4)$. Say, "This is another way of writing 2 groups of 3×4 ."

Now use the interlocking cubes to form 4 arrays each having 2 rows and 3 columns.
e.g.,



STRATEGY 1: Display one array, say, "What multiplication fact can we now use to find the total number of cubes in this array?" (There are 2 row and 3 columns. We can represent the total number of cubes with the multiplication fact 2×3 .) On the chalkboard write 2×3 . Place the three other arrays on top of the first array. Say, "How many groups of 2×3 are there now?" (There are 4 groups of 2×3 .) Write $(2 \times 3) \times 4$ on the chalkboard next to $2 \times (3 \times 4)$. Say, "Let's see if both multiplications will result in the same product. What do the parentheses mean? (They tell us which factors to multiply first.) Point to $2 \times (3 \times 4)$ and say, "How will we multiply these factors?" (We will say three times four equals twelve, twelve times two equals twenty-four.) On the chalkboard write:

$$\begin{array}{rcl} 2 & \times & (3 \times 4) = \\ & & 2 \times 12 = \\ & & 24 \end{array}$$

Point to $(2 \times 3) \times 4$ on the chalkboard. Say, "How will we multiply these factors? (We will say two times three equals six, six times four equals twenty-four.) On the chalkboard write:

$$\begin{array}{rcl} (2 \times 3) \times 4 = \\ 6 \times 4 = \\ 24 \end{array}$$

Say, "What do you notice about the products? (The products are the same.) What do you notice about the factors? (The factors are the same but are grouped differently.) What happens to the product when we change the way we group the same factors?" (The product remains the same.)

NAME: _____ CLASS: _____ DATE: _____

Look at the products each player used. Find the factors for each product and place an X or an O on them. Who will be the winner in each game?

	Player X	Player O
	42	27
Game 1	63	21
	32	48

8x7	6x8	7x9
9x6	~~6x7~~	(3x9)
4x8	7x7	7x3

The winner is _____.

	Player X	Player O
	14	45
Game 2	48	54
	21	24

5x9	3x7	6x8
6x9	7x2	3x9
4x6	4x4	7x4

The winner is _____.

	Player X	Player O
	40	36
Game 3	28	72
	27	12

7x4	6x5	3x4
3x8	9x8	8x5
4x9	3x9	7x7

The winner is _____.

	Player X	Player O
	45	14
Game 4	42	40
	24	54

9x6	3x7	5x9
7x7	7x2	6x7
8x5	6x6	3x8

The winner is _____.

NAME: _____ CLASS: _____ DATE: _____

Hidden in the puzzle below are 20 groups of numbers that can be used to write division facts. They can be read across or up and down. Find and ring each set.

DIVISION SEARCH

16	63	9	7	6	81	16	3
4	11	72	54	6	9	48	8
4	32	8	4	36	9	4	28
20	27	9	3	21	3	2	64
5	8	7	35	3	3	2	42
4	8	49	7	7	10	14	7
18	6	3	5	45	5	9	6
22	30	5	6	12	2	6	4

Write a division fact and a related multiplication fact for each group of numbers you find.

- | | | | |
|----------------------|-------------------|-----------|-------|
| 1. <u>16 ÷ 4 = 4</u> | <u>4 × 4 = 16</u> | 11. _____ | _____ |
| 2. _____ | _____ | 12. _____ | _____ |
| 3. _____ | _____ | 13. _____ | _____ |
| 4. _____ | _____ | 14. _____ | _____ |
| 5. _____ | _____ | 15. _____ | _____ |
| 6. _____ | _____ | 16. _____ | _____ |
| 7. _____ | _____ | 17. _____ | _____ |
| 8. _____ | _____ | 18. _____ | _____ |
| 9. _____ | _____ | 19. _____ | _____ |
| 10. _____ | _____ | 20. _____ | _____ |

NAME: _____

CLASS: _____

DATE: _____

Follow the directions below.



Associative Property -
of Multiplication

Changing the grouping
of the factors does
not change the product.

Show another way in which the factors may be grouped.

$$1. (3 \times 5) \times 4 = \boxed{3 \times (5 \times 4)}$$

$$4. (4 \times 2) \times 3 = \boxed{}$$

$$2. (4 \times 2) \times 6 = \boxed{}$$

$$5. \boxed{} = 6 \times (2 \times 2)$$

$$3. \boxed{} = 1 \times (3 \times 9)$$

$$6. (8 \times 2) \times 3 = \boxed{}$$

Solve each number sentence to show that the products will be the same.

$$1. (2 \times 3) \times 2 = 2 \times (3 \times 2)$$

$$\underline{6 \times 2} = \underline{2 \times 6}$$

$$\underline{12} = \underline{12}$$

$$2. (4 \times 4) \times 1 = 4 \times (4 \times 1)$$

$$\underline{} = \underline{}$$

$$\underline{} = \underline{}$$

$$3. (2 \times 3) \times 3 = 2 \times (3 \times 3)$$

$$\underline{} = \underline{}$$

$$\underline{} = \underline{}$$

$$4. (3 \times 0) \times 5 = 3 \times (0 \times 5)$$

$$\underline{} = \underline{}$$

$$\underline{} = \underline{}$$

$$5. (6 \times 1) \times 3 = 6 \times (1 \times 3)$$

$$\underline{} = \underline{}$$

$$\underline{} = \underline{}$$

$$6. (4 \times 5) \times 2 = 4 \times (5 \times 2)$$

$$\underline{} = \underline{}$$

$$\underline{} = \underline{}$$

Do you remember?

$$\begin{array}{r} 3,548 \\ - 1,279 \\ \hline \end{array} \quad \text{check}$$

$$\begin{array}{r} 5,607 \\ - 3,714 \\ \hline \end{array} \quad \text{check}$$

$$\begin{array}{r} \$63.14 \\ - 18.99 \\ \hline \end{array} \quad \text{check}$$

4.04.01 BASIC MULTIPLICATION FACTS FOR
11 AND 12 THROUGH 144
(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.04.01.01A recognize the basic multiplication facts for
11 and 12 through 144;
e.g.,

$$8 \times 11 = 88$$

$$6 \times 12 = 72$$

4.04.01.02A solve word problems related to skills
learned in this module.
e.g.,

John had 12 cars. Bob had 4 times
as many cars. How many cars did Bob
have?

4.04.01

VOCABULARY

TERMS

multiple
array
factor
product

SYMBOLS

X

GETTING STARTED 1:

Prepare and distribute a multiplication flash card to each student.
e.g.,

$4 \times 8 = \square$

Say, "We will use these cards to practice the multiplication facts we have learned." Ask a student to display his/her card, read it, and ask another student to say the product. If the student says the correct product, he/she may display his/her card and select another student to respond. If an incorrect response is given, the student holding the card may call someone else. Repeat this procedure until each student has had a chance to participate.

GETTING STARTED 2:

Play Buzz to review multiples of 2 through 9. Say, "We will take turns counting by ones until we reach a multiple of 4. Then we will say "buzz" instead of that number."

e.g.,

1, 2, 3, buzz, 5, 6, 7, buzz, . . . 37, 38, 39, buzz.

Repeat this procedure for multiples of other numbers from 2 through 9.

4.04.01

4.04.01.01 recognize the basic multiplication facts for 11 and 12 through 144

STRATEGY 1: Prepare and distribute squared material (tens and ones) to each student or group of students. Say, "How could you represent eleven using the tens and ones? (1 ten and 1 one represents eleven.) Display 1 ten and 1 one on your desk as I demonstrate at the chalkboard. How many groups of eleven are shown on your desk? (I have 1 group of eleven.) How much is that in all? (1 group of eleven equals eleven.) What multiplication sentence could we use to describe our squared material?" (One times eleven equals eleven.) Ask a student to write the multiplication fact on the chalkboard as the other students write it in their notebooks.

e.g.,  □ $1 \times 11 = 11$

Say, "Show another group of eleven below the first group on your desk. Now how many groups of eleven do you have? (I have 2 groups of eleven.) How much do you have in all? (I have 2 tens and 2 ones, or 22, in all.) What multiplication sentence could we use to describe our squared material?" (Two times eleven equals twenty-two.) Ask a student to write the multiplication fact on the chalkboard as the other students write it in their notebooks.

e.g.,  □ $1 \times 11 = 11$

 □ $2 \times 11 = 22$

Repeat this procedure for the remaining multiplication facts of 11 and 12. When all the facts have been computed and written on the chalkboard and in the students' notebooks, ask the students to recite the facts.

STRATEGY 2: Prepare and distribute two pieces of graph paper to each student. Say, "We will use one piece of graph paper to discover the multiplication facts for 11.

4.04.01

STRATEGY 2:

cont'd

On your graph paper, shade in one row of 11 boxes. How many boxes are shaded? (11 boxes are shaded.) Yes, 1 group of 11 equals 11. How can we write that as a multiplication sentence?" ($1 \times 11 = 11$.) Continue through 12 groups of 11. Say, "What pattern did you discover in the multiples of 11 through 9×11 ? Each product is the next larger digit in the tens place and ones place, e.g., 11, 22, 33..." Students should notice that each digit in the product of factors through 9×11 , is the same as the factor by which 11 is multiplied, e.g., $2 \times 11 = 22$, $5 \times 11 = 55$.

Use the second sheet of graph paper to discover the multiplication facts for 12. Upon completion, students may recite the facts for 11 and 12 and write them in their notebooks.

4.04.01.02

solve word problems relating to skills learned in this module

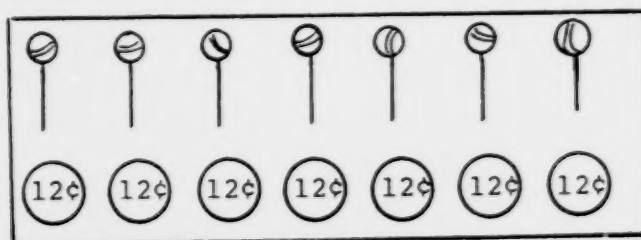
STRATEGY 1:

Prepare and distribute unlined paper to each student. Write a word problem on the chalkboard.
e.g.,

Mary bought 7 lollipops at 12¢ each.
How much did the 7 lollipops cost?

Ask a student to read the problem. Say, "What does the problem ask us to find? (The problem asks us to find the cost of 7 lollipops.) What information do we have? (The lollipops cost 12¢ each.) Let's draw a picture to help us solve this problem." Ask a student to draw his/her picture on the chalkboard.

e.g.,



4.04.01

STRATEGY 1: Say, "How can we use this picture to find the answer to our problem?" (We can add 12¢ seven times or we can multiply $7 \times 12¢$.) Ask the students to solve the problem. Say, "How much did 7 lollipops cost?" (7 lollipops cost 84¢.)

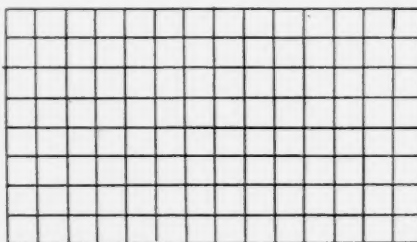
Repeat this procedure using other problems involving the multiplication facts of 11 and 12.

STRATEGY 2: Prepare and distribute graph paper to each student. Write a word problem on the chalkboard.
e.g.,

Mr. Green packs 12 bars of candy
in one box. How many bars of candy
can he put into 6 boxes?

Ask a student to read the problem aloud. Say, "What does the problem ask us to find? (The problem asks us to find how many bars of candy can be put into 6 boxes.) What information do we have that will help us solve the problem?" (12 bars of candy are packed in each box.)

Draw a grid on the chalkboard.
e.g.,



Say, "Let's use our graph paper to help us solve this problem. How many bars of candy fit in one box?" (12 bars of candy fit into one box.) On the chalkboard grid, color in one row of 12 boxes. Ask the students to do the same on their graph paper.

4.04.01

STRATEGY 2:
cont'd

Say, "Each box stands for one candy bar. How many rows of candy bars should we color? (We should color 6 rows of candy bars.) Why? (Each row stands for one box of candy so we need 6 rows to represent 6 boxes.) How can we use our graph paper to solve the problem?" (We can count all the shaded boxes on the graph paper, or we can add 12 six times or we can multiply 6×12 .) Which is the quickest way to solve the problem? (Multiplication is the quickest way.) Ask a student to write $6 \times 12 = \square$ on the chalkboard. Say, "What is the product of 6×12 ? ($6 \times 12 = 72$) How many candy bars can be put into 6 boxes?" (72 candy bars can be put into 6 boxes.)

Repeat this procedure with other problems using the multiplication facts of 11 and 12.

NAME: _____

CLASS: _____

DATE: _____

Play Wheel of Fortune. Solve each multiplication example. Look at the code to find the letter each product represents. Write the letters in the spaces. What is the message?



3 x 11

4 x 12

11 x 11

1 x 12

4 x 11

5 x 12

1 x 12

6 x 12

11 x 11

7 x 11

6 x 11

2 x 12

5 x 11

7 x 11

2 x 12

1 x 11

1 x 12

6 x 11

2 x 12

4 x 12

3 x 12

7 x 12

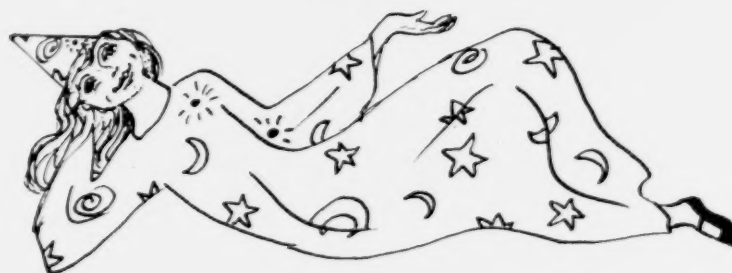
2 x 12

9 x 11

1 x 12

4 x 11

8 x 11



Code

12	96	11	88	60	75	120	22	24	110
A	B	C	D	E	F	G	H	I	J
144	77	72	36	48	55	108	44	132	66
K	L	M	N	O	P	Q	R	S	T
121	0	84	65	33	99				
U	V	W	X	Y	Z				

NAME: _____ CLASS: _____ DATE: _____

Solve each problem.

1. Sonia's dog, Rex, eats 11 pounds of dog food each week. How many pounds of dog food will he eat in 7 weeks?

2. The fourth grade class planted 12 pumpkin seeds in each of 8 pots. How many pumpkin seeds did they plant?

3. Marie's bookcase has 9 shelves. Each shelf has 12 books. How many books are in Marie's bookcase?

4. There are a dozen eggs in each carton. How many eggs will be in 12 cartons?

5. Bill said, "I'm thinking of a number. It is three times as large as 11. What is my number?"

6. Pam planted eight rows of flowers. There were 11 flowers in each row. How many flowers did Pam plant?

7. The baker filled five boxes with twelve donuts in each box. How many donuts did he use?

CHALLENGE!

Anna and Jane played basketball. Together they scored 30 points. If Jane scored 6 more points than Anna, how many points did each girl score?

Anna _____ Jane _____

4.13.03 PROBLEM SOLVING - GUESS AND CHECK

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.13.03.01A

check guesses against problem conditions involving place value problems;

e.g.,

I am thinking of a number.

It is a three-digit number.

It is an odd number.

It reads the same forward and backward.

The sum of the digits is 5.

What is the number?

*4.13.03.02A

check guesses against problem conditions involving addition and subtraction problems;

e.g.,

- Can you make a magic square? Using the digits 1 through 9 only once, arrange them so that every row, every column, and each diagonal adds up to 15.

e.g.,

	3	8
9	5	1
2		6

- I am thinking of a number.

It is a two-digit number.

It is odd.

It is between 70 and 80.

When the ones digit is subtracted from the tens digit, the difference is 2.

What is the number?

4.13.03.03A

check guesses against problem conditions involving multiplication and division problems.

e.g.,

- What numbers are on my 3 cards?
Each number is less than 10.
Each number is different.
There are no even numbers.
The sum of the three numbers is the same as the product of two of the numbers.

- I am a number between 60 and 70.
I am an even number.
My ones digit is the same as the quotient when 12 is divided by 3.
Who am I?

VOCABULARYTERMS

estimate
guess
conditions
consecutive

GETTING STARTED 1:

Say, "Today we will see how good a detective you can be. We will solve problems with the help of some clues. After each clue we are going to guess what the answer to our problem might be." Ask the students to solve each problem in their notebooks as one student works at the chalkboard. Write a problem on the chalkboard.

e.g.,

What is the Secret Letter?

1. The letter is in the word "great".
2. The letter is not in the word "friend".
3. The letter is a vowel.

Say, "We will use our clues to find the secret letter. After each clue we will write down all of the possibilities." Ask a student to read the first clue. Say, "What are the possible letters according to that clue?" (The letters that are possible according to that clue are g, r, e, a, and t.) Ask the students to write the possible letters in their notebooks as a student writes at the chalkboard.

e.g.,	<u>Clue</u>	<u>Possibilities</u>
1.	The letter is in the word "great".	1. g, r, e, a, t
2.	The letter is not in the word friend.	2. g, ~~r~~ , ~~e~~ , a, t
3.	The letter is a vowel.	3. ~~g~~ , ~~r~~ , ~~e~~ , a, ~~t~~

Say, "What is the secret letter?" (The secret letter is a.) After the students have found the secret letter ask them to check to see if the answer fits all the clues.

Repeat this procedure using other non-numerical word problems.

4.13.03

GETTING STARTED 2:

Prepare and display a box of paper clips. Say, "Today we are going to see how good we are at estimating. About how many paper clips wide do you think the top of your desk is?" Elicit estimates from the students. Record the estimates on the chalkboard.

e.g.,

<u>Desk Width</u>	
<u>Student</u>	<u>First Estimate</u>
Jose	30 paper clips
Mary	25 paper clips
Chan	40 paper clips

Say, "How can we find out if any of our estimates are correct?" (We can check our estimates by placing the paper clips end to end to measure the width of our desks.) Ask a student to begin measuring across the desk using the paper clips. When he/she has measured about half way across the desk, say, "How many paper clips did you use so far?" (Answers will vary.) Ask the students to revise their estimate based on the new data and list the revised estimates in the next column on the chalkboard.

e.g.,

<u>Student</u>	<u>First Estimate</u>	<u>Second Estimate</u>	<u>Actual Measurement</u>
Jose	30 paper clips	25 paper clips	
Mary	25 paper clips	26 paper clips	
Chan	40 paper clips	27 paper clips	

Ask a student to continue measuring across the desk. When the measuring is completed, say, "How many paper clips wide is your desk?" List the actual measurement on the chalkboard. Say, "Which first estimate was closest to the actual measurement? Which second measurement was closest to the actual measurement?"

4.13.03

4.13.03.01 check guesses against problem conditions involving place value problems

STRATEGY 1: Prepare and distribute to each student or group of students an envelope with a guess and check place value problem written on the outside of the envelope.
e.g.,

It is a 2-digit number.
It is an odd number.
The tens digit is 3 more than the ones digit.
The sum of the digits is 9.

Place a piece of paper with the answer to each problem inside the envelope. Say, "Today we will solve some number problems. These number problems will have clues to help us solve them." Ask a student to read the first clue. Say, "What numbers are possible? (Any 2-digit number is possible.) We need more information before we can make a good guess. Read the second clue. What do you know about this 2-digit number? (It is odd.) To be odd, what numbers are possible in the ones place?" (The digit in the ones place can be 1, 3, 5, 7, or 9.) On the chalkboard write 1, 3, 5, 7, 9. Say, "How does this narrow down the numbers that are possible? (We know now that the 2-digit number must have 1, 3, 5, 7, or 9 in the ones place.) Let's look at the next clue to narrow down our choices even further. Read the third clue. What numbers are possible? (For the tens digit to be 3 more than the ones digit, the choices are now 41, 63, and 85.) Why? (4 is 3 more than 1, 6 is 3 more than 3, and 8 is 3 more than 5.) Why did you eliminate the 7 or 9 in the ones place?" (We can't have a tens digit that is 3 more than 7 or 9 because that would give us 2 digits in the tens place and that would be a 3-digit number.) Write the 3 choices on the chalkboard, e.g., 41, 63, and 85. Say, "Let's look at the last clue to determine the one possible solution. Which of the

4.13.03

STRATEGY 1: three choices has digits whose sum is 9?" (63 has digits whose sum is 9. 63 is the only number which fits all the clues.) Ask the students to check and explain why 63 satisfies all the problem conditions.

cont'd

Say, "Now see if you can solve the problems written on your envelope. When you have solved the problem check to see that all the conditions stated in the problem have been met. Then you may open the envelope to see if your answer matches the one inside the envelope." Encourage the students to exchange envelopes for additional reinforcement. Provide time for the students to explain their solutions.

4.13.03.02 check guesses against problem conditions involving addition and subtraction problems

STRATEGY 1: Prepare and display a word problem on the chalkboard.
e.g.,

Albert packed 14 books in two boxes, a large box and a small box. The large box had 2 more books than the small box. How many books were in the small box?

Ask a student to read the problem aloud. Say, "What do we want to find out in this problem? (We want to find out the number of books in the small box.) Some problems are not readily solved by addition or subtraction. In order to solve this problem we can use a guess and check strategy. What information or clues are given in the problem?" (There were 14 books. There were 2 boxes. The large box had 2 more books than the small box.) On the chalkboard list the information elicited from the students. Ask the students to guess how many books are in the small box. Write the guesses on the chalkboard. If a student guesses that there are 4 books in the small

4.13.03

STRATEGY 1: box say, "If there are 4 books in the small box, how many books would there be in the large box? (There would be 6 books in the large box.) Why?" (The large box has 2 more books than the small box.) Demonstrate on the chalkboard.

e.g.,

<u>Number of Books in the Small Box</u>	<u>Number of Books in the Large Box</u>
4	$4 + 2 = 6$

Say, "How can you determine if your guess is correct?" (It is not correct since the total amount should equal 14 books and my guesses total only 10 books.)

Continue to guess and check until the correct answer has been elicited from the students. Say, "What is the correct solution?" (There are 6 books in the small box and 8 books in the large box.) Ask a student to explain how the solution meets all of the conditions stated in the problem.

Repeat this procedure using other addition and subtraction story problems.

4.13.03.03 check guesses against problem conditions involving multiplication and division problems

STRATEGY 1: Prepare and display a secret number box. Place the clues for several guess and check problems involving multiplication and division inside the box. Say, "We have been solving problems using a guess and check strategy. How do we find out if our answer is correct in a guess and check problem? (Our answer is correct if the answer fits all the clues.) Today we will open our mystery box and use the clues to solve several problems that will give us a secret number." Ask a student to select a problem from inside the box and to read the clues to the students.

4.13.03

STRATEGY 1: e.g.,
cont'd

1. I am a number between 40 and 50.
2. I am an even number.
3. The product of my digits is 24.

Say, "What is the first clue?" (I am a number between 40 and 50.) Write the clue on the chalkboard and ask the students to list all the possibilities in their notebooks as one student writes the possibilities on the chalkboard.

e.g.,

<u>Clues</u>	<u>Possibilities</u>
1. I am a number between 41, 42, 43, ... 49 40 and 50.	

Repeat this procedure for the second and third clues to find the secret number. Elicit an understanding from the students that the possibilities after each clue depend on, and are drawn from, the possibilities of the previous clue.

e.g.,

<u>Clues</u>	<u>Possibilities</u>
1. I am a number between 41, 42, 43, ... 49 40 and 50.	
2. I am an even number.	42, 44, 46, 48
3. The product of my digits is 24.	46

Say, "What is the secret number? (The secret number is 46.) How do we know our answer is correct?" (The answer fits all of the conditions stated in the clues.) Ask the students to show that 46 satisfies all of the problem conditions by writing the following check on the chalkboard:

- $40 < 46 < 50$
- 46 is an even number since 6 is in the ones place
- $4 \times 6 = 24$
- 23S.4 -

4.13.03

STRATEGY 1: Repeat this procedure using other guess and check problems involving multiplication and division.

STRATEGY 2: Prepare and display the following word problem on the chalkboard:

Martha and her sister sold 18 boxes of cookies.
If Martha sold twice as many boxes as her sister, how many boxes of cookies did Martha sell?

Ask a student to read the problem. Say, "What do we want to find out in this problem? (We want to find out the number of cookies that Martha sold.) What information do we have? (We know how many boxes were sold. We know that Martha sold twice as many boxes as her sister.) How can we solve this problem?" (We can use a guess and check strategy.) Ask the students to guess how many boxes of cookies Martha's sister sold. Write the guess on the chalkboard as the students work in their notebooks.

e.g.,

<u>Number of Boxes Sold by Martha</u>	<u>Number of Boxes Sold by Her Sister</u>
?	4

Say, "If Martha's sister sold 4 boxes of cookies, how many boxes did Martha sell? Remember, Martha sold two times as many boxes as her sister." (Her sister would have sold 8 boxes of cookies if Martha sold 4 boxes.)

Demonstrate at the chalkboard.

e.g.,

<u>Number of Boxes Sold by Martha</u>	<u>Number of Boxes Sold by Her Sister</u>
4 x 2 = 8	4

Say, "How can we determine if our guess is correct?" (Our guess is not correct since the total of 8 plus 4 does not equal 18.)

Continue this procedure of guessing and checking until the correct answer, 12, has been elicited from

4.13.03

STRATEGY 2: the students. Ask a student to explain how the
cont'd solution meets all of the conditions stated in the
problem.

Continue this procedure using other multiplication
and division word problems.

NAME: _____ CLASS: _____ DATE: _____

Guess and check to solve each problem.

GUESS MY NUMBER

CLUES I am between 30 and 38. I am an odd number. My digits are the same. I am the number _____.	POSSIBILITIES	CLUES I am a 2-digit number. I am an even number. The sum of my digits is 17. I am the number _____.	POSSIBILITIES
CLUES I am greater than 60 but less than 75. I am an even number. The sum of my digits is 10. I am the number _____.	POSSIBILITIES	CLUES I am a 2-digit number. I am an odd number. My digits are <u>consecutive</u> . The sum of my digits is 5. I am the number _____.	POSSIBILITIES
CLUES I am a 3-digit number. I am an even number. I read the same forward and backward. The sum of my digits is 5. I am the number _____.	POSSIBILITIES	CLUES I am a 3-digit number. I am an even number. All three digits are the same. The sum of my digits is 12. I am the number _____.	POSSIBILITIES

CHALLENGE!

Jackie ate $\frac{1}{4}$ of the pie. Ted ate $\frac{1}{2}$ of the pie. What part of the pie was eaten?

HINT: Draw a picture. _____

NAME: _____

CLASS: _____

DATE: _____

Follow the directions below.

Fill in the number needed to solve each addition magic square.

Remember : The sum of the numbers across,
down, and diagonally is the same.

6	1	8
7	5	3
2	<u>9</u>	4

9	2	7
4		8
5	10	3

8	7	12
13	9	
6	11	10

Solve

Jenny has 3
different coins.
The total value
of the coins is
40¢. What are
the coins?

Penny jogged a total
of 12 miles on Saturday
and Sunday. On
Saturday she jogged
2 miles less than on
Sunday. How many miles
did she jog on Saturday?

_____ miles

I am a 2-digit
number. I am odd.
I am between 60
and 70. The
difference between
my tens digit and
my ones digit is 5.

I am _____.

The sum of 3
consecutive numbers
is 18. What are the
numbers?

Do you remember?

check

$$\begin{array}{r} 300 \\ - 195 \\ \hline \end{array}$$

check

$$\begin{array}{r} \$50.00 \\ - 28.85 \\ \hline \end{array}$$

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Fill in the number needed to solve each multiplication magic square.

Remember - In a Multiplication magic square the product of the factors in each row($\longleftrightarrow$) and each column($\updownarrow$) must be the same.

2	3	3
3	6	1
3	1	6

12	2	1
1	3	
2	4	3

4	12	2
6	2	8
4	4	

What's My Number?

I am less than 7×5 .
 I am greater than 7×4 .
 I am an even number.
 The product of my digits is 6.
 I am _____.

I am a 2-digit number.
 My digits are the same.
 I am divisible by 5.
 I am _____.

I am between 20 and 30.
 I am an odd number.
 I can be divided by 3 and by 9.
 I am _____.

I am a 2-digit number.
 I am odd.
 The sum of my digits is 9.
 The product of my digits is 20.

I am _____.

I am between 30 and 40.
 I am an even number.
 I can be divided by 4 and by 9.
 I am _____.

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SHARPENING YOUR SKILLS

Units 17, 18, 19

Name: _____ Class: _____ Date: _____

1. $7 \times 6 =$

2. $4 \times 8 =$

3. $9 \times 5 =$

4. $3 \times 11 =$

5. $8 \times 12 =$

6. $(3 \times 4) \times 6 = 3 \times (\square \times 6)$

(a) 3

(c) 6

(b) 4

(d) Not Here

7. $9 \overline{)63}$

(e) 6

(g) 8

(f) 7

(h) Not Here

8. $28 \div 4 =$

9. $8 \overline{)72}$

(a) 6

(c) 8

(b) 7

(d) Not Here

10. $18 \div 6 = 3$

Which number sentence could be used to check the division example?

(e) $9 \times 2 = 18$

(g) $18 \div 2 = 9$

(f) $3 \times 6 = 18$

(h) Not Here

11. $56 \div 8 =$

12. $54 \div 9 =$

13. Tammy made 9 stacks of pennies with 11 pennies in each stack. How many pennies does Tammy have in all?

Tammy has _____ pennies.

14. I am a number between 20 and 30.
I am an even number.
My ones digit is greater than my tens digit.
The product of my digits is 8.

I am the number _____.

15. I am a number with two digits.
I am greater than 78.
I am less than 98.
The sum of my digits is 14.
The product of my digits is 45.

230 I am the number _____.

**4.04.02 MULTIPLICATION OF 2- AND 3-DIGIT
NUMBERS BY A 1-DIGIT NUMBER**
(3-4 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

- *4.04.02.01A multiply 10 and 100 by a 1-digit number;
e.g.,

$$\begin{array}{r} 10 \\ \times 2 \\ \hline 20 \end{array} \quad \begin{array}{r} 100 \\ \times 2 \\ \hline 200 \end{array}$$

- 4.04.02.02A multiply multiples of 10 and 100 by a 1-digit number;
e.g.,

$$\begin{array}{r} 20 \\ \times 2 \\ \hline 40 \end{array} \quad \begin{array}{r} 200 \\ \times 2 \\ \hline 400 \end{array}$$

- 4.04.02.03A use the distributive property of multiplication over addition;
e.g.,

$$\begin{aligned} 6 \times 18 &= 6 \times (10 + 8) \\ &= (6 \times 10) + (6 \times 8) \\ &= (60) + (48) \\ &= 108 \end{aligned}$$

- *4.04.02.04A multiply 2- and 3-digit numbers by a 1-digit number without regrouping (exchange);
e.g.,

$$\begin{array}{r} 21 \\ \times 3 \\ \hline 63 \end{array} \quad \begin{array}{r} 321 \\ \times 3 \\ \hline 963 \end{array}$$

4.04.02.05A

multiply 2- and 3-digit numbers by a 1-digit number with regrouping (exchange);

e.g.,

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \end{array} \quad \begin{array}{r} 324 \\ \times 6 \\ \hline 1,944 \end{array}$$

4.04.02.06A

solve word problems related to skills learned in this module.

e.g.,

There are 41 books in each of 9 boxes. How many books are there in all the boxes?

VOCABULARYTERMS

multiply
factor
product
distributive property

GETTING STARTED 1:

Prepare tape and two sets of cards, each card having a numeral from 2 through 9 on it. Draw the following on the chalkboard:



Shuffle each set of cards and place them face down on a desk near the chalkboard.

Ask a student to come to the chalkboard and select a card from each set. Say, "Each card is a factor. Tape one of the factors in the circle and the other in the rectangle. Then write the product in the triangle."

e.g.,



Ask a student to read the multiplication sentence aloud.

Repeat this procedure so that other students may participate.

GETTING STARTED 2:

Write a number on the chalkboard. The number must be the product of two 1-digit factors, e.g., 16. Say, "What two factors will have 16 as a product? (8 times 2 equals 16.) Can you think of any other pairs of factors whose product equals 16?" (4 times 4 equals 16; 16 times 1 equals 16.)

Repeat this procedure with other products through 81.

4.04.02

4.04.02.01 multiply 10 and 100 by a 1-digit number

STRATEGY 1: Prepare and distribute squared material (tens and hundreds) to each student or group of students. Say, "How many ones equal 1 ten? (10 ones equal 1 ten.) Place 2 tens in the center of your desk. How can we find how much we have in all?" (We can add 10 plus 10 which equals 20 or we can multiply 2 times 10 which also equals 20.) Ask a student to write a vertical example for 2 times 10 equals 20 on the chalkboard. e.g.,

$$\begin{array}{r} 10 \\ \times 2 \\ \hline 20 \end{array}$$

Continue this procedure using different numbers of tens as the students write the multiplication examples on the chalkboard and in their notebooks. e.g.,

$\begin{array}{r} 10 \\ \times 2 \\ \hline 20 \end{array}$	$\begin{array}{r} 10 \\ \times 3 \\ \hline 30 \end{array}$	$\begin{array}{r} 10 \\ \times 4 \\ \hline 40 \end{array}$	$\begin{array}{r} 10 \\ \times 5 \\ \hline 50 \end{array}$	$\begin{array}{r} 10 \\ \times 6 \\ \hline 60 \end{array}$	$\begin{array}{r} 10 \\ \times 7 \\ \hline 70 \end{array}$	$\begin{array}{r} 10 \\ \times 8 \\ \hline 80 \end{array}$	$\begin{array}{r} 10 \\ \times 9 \\ \hline 90 \end{array}$
--	--	--	--	--	--	--	--

Say, "What do you notice about the product when one factor is 10 and the other factor is a 1-digit number? (When one factor is 10 and the other factor is a 1-digit number the product has the other factor in the tens place and a zero in the ones place.) Which numbers can be multiplied as basic facts?" (The non-zero numbers can be multiplied as basic facts.)

Repeat this procedure using hundred squares for multiplying 100 by the factors 2 through 9.

STRATEGY 2: Draw a number line with each multiple of ten covered by a lettered 5" x 7" card. e.g.,



4.04.02

STRATEGY 2: Say, "Pretend this is a road map. The distance between each pair of cards is 10 miles. How far would you have gone if you drove from HOME to C? (I would have gone 30 miles.) How did you know that 30 was the correct answer? (The distance between each card is 10 so I counted by tens, 10, 20, 30.) How could you do it another way? (The distance between each pair of cards is ten so the distance from HOME to C is 3 tens or 30.) We can also use multiplication to find the answer." Demonstrate using the number line and uncover the card labeled C. e.g.,



Say, "3 jumps of 10 equals 30." Ask a student to write the multiplication example on the chalkboard which represents 3 jumps of 10 equals 30 while the other students write it in their notebooks.

e.g.,

$$\begin{array}{r} 10 \\ \times 3 \\ \hline 30 \end{array}$$

Continue this procedure "traveling" from HOME to other cards and asking the students to write the appropriate multiplication examples. Say, "What pattern do you see?" (The product has 1 zero just like the factor 10 and the digit in the tens place in the product is the same as the other factor.)

Repeat this procedure using multiples of one hundred on a similar number line.

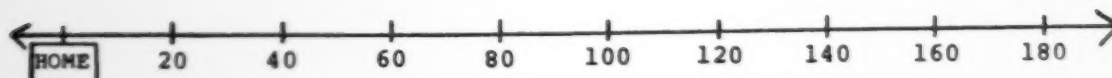
4.04.02.02 multiply multiples of 10 and 100 by a 1-digit number

STRATEGY 1: Adapt Strategy 1, P.O. 4.04.02.01 for use with multiplication of multiples of 10 and 100 by a 1-digit number.

4.04.02

STRATEGY 2: Adapt Strategy 2, P.O. 4.04.02.01 by changing the number lines to multiples of 10 and 100.

e.g.,



4.04.02.03 use the distributive property of multiplication over addition

STRATEGY 1: Prepare and distribute squared material (tens and ones). Say, "Use the squared material to represent the number 14. What is another name for 14? (Another name for 14 is $10 + 4$.) How did you show 14? (I used 1 ten and 4 ones.) Now show another model of 14 beneath the first model."

e.g.,

Say, "What does this show? (This shows 2 groups of 14 or 2 groups of 10 and 2 groups of 4.) How can this be written using number sentences?" Elicit and write:

$$\begin{aligned}
 2 \times 14 &= 2 \times (10 + 4) \\
 &= (2 \times 10) + (2 \times 4)
 \end{aligned}$$

Say, "The multiplication by 2 is distributed over the addends 10 and 4. How much is 2 groups of 10? (2 groups of ten equals 20.) How much is 2 groups of 4? (2 groups of 4 equals 8.) How much is 20 plus 8?" (20 plus 8 equals 28.) Complete the expression on the chalkboard.

4.04.02

STRATEGY 1: e.g.,

cont'd

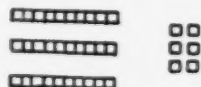
$$\begin{aligned}2 \times 14 &= 2 \times (10 + 4) \\&= (2 \times 10) + (2 \times 4) \\&= 20 + 8 \\&= 28\end{aligned}$$

Say, "When we express a factor as two addends, we must multiply both addends by the other factor and then add the two products together for the final product. This is called the distributive product of multiplication."

Repeat this procedure using other numbers.

4.04.02.04 multiply 2- and 3-digit numbers by a 1-digit number without regrouping (exchange)

STRATEGY 1: Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Say, "We have used the distributive property of multiplication over addition to solve some multiplication examples. Today, we will learn a shorter way to do the multiplication. Use your squared material to represent the number 12. How did you show 12? (I used 1 ten and 2 ones.) Now show two more models of 12 beneath the first model." e.g.,



Say, "What does this show?" (This shows 3 groups of 12 or 3 groups of 10 and 3 groups of 2. Ask a student to write the sentences on the chalkboard using the distributive property.

e.g.,

$$\begin{aligned}3 \times 12 &= 3 \times (10 + 2) \\&= (3 \times 10) + (3 \times 2)\end{aligned}$$

Say, "How can we solve this problem?" (We can multiply 3×10 and 3×2 and then add their products.)

4.04.02

STRATEGY 1: Ask another student to write a multiplication example that represents the squared material in vertical format on the chalkboard.

cont'd

e.g.,

$$\begin{array}{r} 3 \times 12 = 3 \times (10 + 2) \\ 3 \times 12 = (3 \times 10) + (3 \times 2) \end{array} \quad \begin{array}{r} 12 \\ \times 3 \\ \hline \end{array}$$

Say, "How can we find the product using what the distributive property tells us?" (The distributive property tells us to multiply the 3 times 10 and then to multiply 3 times 2.) Ask a student to solve the example using the distributive property.

e.g.,

$$\begin{array}{l} 3 \times 12 = 3 \times (10 + 2) \\ 3 \times 12 = (3 \times 10) + (3 \times 2) \\ 3 \times 12 = 30 + 6 \\ 3 \times 12 = 36 \end{array}$$

Say, "What is the product? (The product is 36.) We can also find the product using the vertical format. In which place do we begin in addition and subtraction examples? (We begin in the ones place in addition and subtraction examples.) We also begin in the ones place in multiplication examples. Look at the second step in the example solved using the distributive property. How can we use this to solve the example in vertical format?" (Since we must begin in the ones place, we can think 3 times 2 and then 3 times 10.) Say and write each step on the chalkboard.

e.g.,

Step 1

Think: $(3 \times 2) = 3 \times 2$ ones
= 6 ones

Write:
$$\begin{array}{r} 12 \\ \times 3 \\ \hline 6 \end{array}$$

Step 2

Think: $(3 \times 10) = 3 \times 1$ ten
= 3 tens

Write:
$$\begin{array}{r} 12 \\ \times 3 \\ \hline 36 \end{array}$$

Say, "Look at your squared material. What is the total represented?" (The total represented is 36, the same as the product in our multiplication example.)

4.04.02

STRATEGY 1: Repeat this procedure for multiplying other 2- and 3-digit numbers without regrouping. Ask the students to write and solve the examples in their notebooks after demonstrating with their squared material.

cont'd

Note: Some students may benefit from working through an intermediate step in the multiplication process.

e.g.,

$$\begin{array}{r} 12 \\ \times 3 \\ \hline 6 \\ +30 \\ \hline 36 \end{array}$$

STRATEGY 2: Draw a place value chart on the chalkboard. Ask a student to write 23 on the chart.

e.g.,

tens	ones
2	3

Say, "How can we find the number for 3 groups of 23? (We can add 23 plus 23 plus 23 or we can multiply 3 times 23.) Which is usually quicker, adding or multiplying? (Multiplication is usually quicker.) How can we write 3 groups of 23 as a number sentence?" Elicit and write on the chalkboard:

$$3 \times 23 = 3 \times (20 + 3)$$

$$3 \times 23 = (3 \times 20) + (3 \times 3)$$

Say, "How can we solve the problem?" (We can multiply 3 times 20 and 3 times 3 and add their products.) Ask a student to write a 3 in the ones column on the place value chart and to place a multiplication symbol to the left of the chart.

e.g.,

tens	ones
2	3
x	3

Say, "Where should we begin our computation? (We begin our computation in the ones column.) What does

4.04.02

STRATEGY 2:

cont'd

the distributive property tell us? (The distributive property tells us to multiply 3 times 20 and 3 times 3.) How can we use this in the example in vertical format?" (To begin with the ones place, we can multiply 3 times 3 first, and then multiply 3 times 20.) How much is 3 groups of 3 ones?" (3 groups of 3 ones is 9 ones.) Ask a student to write a 9 in the ones place in the product. Say, "We have multiplied the ones, what should we do next? (We will multiply the tens.) How much is 3 groups of 2 tens?" (3 groups of 2 tens equals 6 tens or 60.) Ask a student to write a 6 in the tens place in the product to represent 60. Say, "What is the product of 3 times 23?" (The product of 3 times 23 is 69.) Ask the students to write this example in their notebooks. Repeat this procedure multiplying other 2- and 3-digit numbers by 1-digit numbers without regrouping. See Note after Strategy 1, P.O. 4.04.02.04.

4.04.02.05

multiply 2- and 3-digit numbers by a 1-digit number with regrouping (exchange)

STRATEGY 1:

Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Ask the students to display 25 using their squared material. Say, "How did you show 25?" (I used 2 tens and 5 ones.)

e.g.,

■■■■■■■■	■■■■■
■■■■■■■■	

Ask the students to show 2 more groups of 25 below the first group. Say, "What does your squared material show now?" (It shows 3 groups of 25 or 6 groups of 10 and 3 groups of 5.)

e.g.

■■■■■■■■	
■■■■■■■■	■■■■■
■■■■■■■■	■■■■■
■■■■■■■■	■■■■■
■■■■■■■■	
■■■■■■■■	

- 25S.7 -

240

4.04.02

STRATEGY 1: Elicit and write on the chalkboard:

cont'd

$$\begin{aligned} 3 \times 25 &= 3 \times (20 + 5) \\ &= (3 \times 20) + (3 \times 5) \\ &= 60 + 15 \\ &= 75 \end{aligned}$$

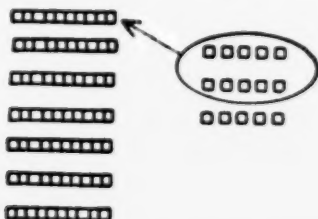
Say, "How much is 3 groups of 25?" (Three groups of 25 is 75.) Ask a student to write the example in vertical format on the chalkboard.

e.g.,

$$\begin{array}{r} 3 \times 25 = 3 \times (20 + 5) \\ = (3 \times 20) + (3 \times 5) \end{array} \quad \begin{array}{r} 25 \\ \times 3 \\ \hline \end{array}$$

Say, "Where will we begin our computation? (We will begin in the ones column.) What does the distributive property tell us? (The distributive property tell us to multiply 3 times 20 and 3 times 5.) We must do that in the vertical example, also. How can we use the distributive property to solve this example? (We can multiply 3 times 5 first and then, 3 times 20.) How much is 3 groups of 5 ones? (3 groups of 5 ones equals 15 ones.) Why can't we write 15 in the ones column in the product? (We cannot write a number greater than 9 in any column.) How can we regroup the ones so that we will have a 1-digit number to write in the ones column?" (We can regroup 15 ones as 1 ten and 5 ones.) Ask the students to regroup using the squared material.

e.g.,



Ask a student to write the 5 in the ones column in the product and to write a 1 above the tens column to represent the ten we got when we regrouped.

4.04.02

STRATEGY 1: e.g.,
cont'd

$$\begin{array}{r} 25 \\ \times 3 \\ \hline 75 \end{array}$$

Say, "How much is 3 groups of 2 tens? (3 groups of 2 tens is 6 tens.) Look at your squared material. How many tens are there? (There are 7 tens.) How can we find 7 tens? (3 times 2 tens equals 6 tens plus the 1 ten we got from regrouping equals 7 tens.) When we multiply the tens, we must remember to add the ten we regrouped to the other tens in the product."
e.g.,

$$\begin{array}{r} 25 \\ \times 3 \\ \hline 75 \end{array}$$

Say, "How does this product compare with the product we found using the distributive property?" (They are the same.) Ask the students to copy the example in their notebooks.

Repeat this procedure multiplying other 2- or 3-digit numbers by 1-digit numbers with regrouping.

See **Note** after Strategy 1, P.O. 4.04.02.04.

STRATEGY 2: Draw a place value chart on the chalkboard and ask a student to write 38 on the chart.

e.g.,

tens	ones
3	8

Say, "How can we find the value of 2 groups of 38?" (We can multiply 2 times 38.) Ask a student to write a 2 in the ones column below the 38 and to place a multiplication symbol to the left of the chart.

e.g.,

tens	ones
3	8
x	2

4.04.02

STRATEGY 2:

cont'd

Say, "How can we use the distributive property to solve this example? (Since 38 equals 30 + 8, we can multiply 2 times 8 and 2 times 30.) How much is 2 times 8? (2 times 8 is 16.) Why can't we write 16 in the ones column? (We cannot write a 2-digit number in any one column.) What should we do?" (We should regroup 16 as 1 ten and 6 ones.) Demonstrate in the example at the chalkboard as you say, "After regrouping we write the 6 in the ones column in the product and we write the 1 ten at the top of the tens column."

e.g.,

tens	ones
3	8
x	2
	6

Say, "How much is 2 times 3 tens? (2 times 3 tens is 6 tens.) We must now add the regrouped ten to the 6 tens. How much is 6 tens plus 1 ten?" (6 tens plus 1 ten is 7 tens.) Demonstrate in the example at the chalkboard as you say, "2 times 3 tens is 6 tens, plus 1 more ten is 7 tens." Write 7 in the product in the tens place.

e.g.,

tens	ones
3	8
x	2
7	6

Ask the students to copy the example in their notebooks. Repeat this procedure multiplying other 2-and 3-digit numbers by 1-digit multipliers with regrouping.

See Note after Strategy 1, P.O. 4.04.02.04.

4.04.02

4.04.02.06 solve word problems related to skills learned in this module

STRATEGY 1: Write a word problem on the chalkboard.
e.g.,

Mr. Gray, the school custodian at P.S.
999, bought 6 boxes of tiles for the 3rd
floor gymnasium. There were 125 tiles in
each box. How many tiles did he buy in
all?

Say, "There are a number of ways to solve a problem but some ways are faster than others." Ask a student to read the problem aloud. Say, "Which information is needed to solve the problem?" (The information we need is the number of tiles in each box and the number of boxes he bought.) Separate the students into groups and ask each group to select a strategy for solving the problem. When the students have solved the problem, ask each group how they solved the problem. (Accept all reasonable answers.)

Say, "Whose method was the fastest?" (The group who multiplied 125 by 6 had the fastest method.) Ask a student from that group to show and explain the multiplication at the chalkboard.

e.g.,

$$\begin{array}{r} 125 \text{ tiles in a box} \\ \times 6 \text{ boxes} \\ \hline 750 \text{ tiles in all} \end{array}$$

Say, "What is the answer to the problem?" (Mr. Gray bought 750 tiles altogether.) Repeat this procedure with other word problems.



NAME: _____ CLASS: _____ DATE: _____

Complete the examples below.

$\begin{array}{r} 10 \\ \times 3 \\ \hline 30 \end{array}$	$\begin{array}{r} 10 \\ \times 5 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 7 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 2 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 1 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 9 \\ \hline \end{array}$	$\begin{array}{r} 10 \\ \times 4 \\ \hline \end{array}$
--	---	---	---	---	---	---	---

$\begin{array}{r} 100 \\ \times 4 \\ \hline 400 \end{array}$	$\begin{array}{r} 100 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ \times 3 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ \times 7 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ \times 9 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ \times 5 \\ \hline \end{array}$	$\begin{array}{r} 100 \\ \times 8 \\ \hline \end{array}$
--	--	--	--	--	--	--

You can multiply multiples of 10 and 100 if you know your basic facts.

$2 \times 3 = 6$	$2 \times 30 = 60$	$2 \times 300 = 600$
------------------	--------------------	----------------------

$5 \times 3 = \underline{\hspace{2cm}}$	$5 \times 30 = \underline{\hspace{2cm}}$	$5 \times 300 = \underline{\hspace{2cm}}$
$4 \times 5 = \underline{\hspace{2cm}}$	$4 \times 50 = \underline{\hspace{2cm}}$	$4 \times 500 = \underline{\hspace{2cm}}$
$3 \times 8 = \underline{\hspace{2cm}}$	$3 \times 80 = \underline{\hspace{2cm}}$	$3 \times 800 = \underline{\hspace{2cm}}$
$9 \times 6 = \underline{\hspace{2cm}}$	$9 \times 60 = \underline{\hspace{2cm}}$	$9 \times 600 = \underline{\hspace{2cm}}$
$7 \times 4 = \underline{\hspace{2cm}}$	$7 \times 40 = \underline{\hspace{2cm}}$	$7 \times 400 = \underline{\hspace{2cm}}$

$\begin{array}{r} 600 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 70 \\ \times 4 \\ \hline \end{array}$	$\begin{array}{r} 80 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 500 \\ \times 7 \\ \hline \end{array}$	$\begin{array}{r} 900 \\ \times 2 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ \times 8 \\ \hline \end{array}$
--	---	---	--	--	---

NAME: _____ CLASS: _____ DATE: _____

Use the distributive property of multiplication to solve each example.

$$\begin{array}{rcl}
 5 & \times & 17 & = \\
 5 & \times & (10 + 7) & = \\
 (5 \times 10) + (5 \times 7) & = & \\
 \underline{50} + \underline{35} & = & \boxed{85}
 \end{array}$$

$$\begin{array}{rcl}
 3 & \times & 25 & = \\
 3 & \times & (\underline{\quad} + \underline{\quad}) & = \\
 (3 \times \underline{\quad}) + (3 \times \underline{\quad}) & = & \\
 \underline{\quad} + \underline{\quad} & = & \boxed{}
 \end{array}$$

$$\begin{array}{rcl}
 2 & \times & 19 & = \\
 2 & \times & (\underline{\quad} + \underline{\quad}) & = \\
 (2 \times \underline{\quad}) + (2 \times \underline{\quad}) & = & \\
 \underline{\quad} + \underline{\quad} & = & \boxed{}
 \end{array}$$

$$\begin{array}{rcl}
 6 & \times & 15 & = \\
 6 & \times & (\underline{\quad} + \underline{\quad}) & = \\
 (6 \times \underline{\quad}) + (6 \times \underline{\quad}) & = & \\
 \underline{\quad} + \underline{\quad} & = & \boxed{}
 \end{array}$$

$$\begin{array}{rcl}
 4 & \times & 22 & = \\
 \underline{\quad} & \times & (20 + 2) & = \\
 (\underline{\quad} \times 20) + (\underline{\quad} \times 2) & = & \\
 \underline{\quad} + \underline{\quad} & = & \boxed{}
 \end{array}$$

$$\begin{array}{rcl}
 7 & \times & 18 & = \\
 \underline{\quad} & \times & (\underline{\quad} + \underline{\quad}) & = \\
 (\underline{\quad} \times \underline{\quad}) + (\underline{\quad} \times \underline{\quad}) & = & \\
 \underline{\quad} + \underline{\quad} & = & \boxed{}
 \end{array}$$

CHALLENGE!

$$\begin{array}{rcl}
 3 & \times & 146 & = \\
 3 & \times & (\underline{\quad} + \underline{\quad} + \underline{\quad}) & = \\
 (3 \times \underline{\quad}) + (3 \times \underline{\quad}) + (3 \times \underline{\quad}) & = & \\
 \underline{\quad} + \underline{\quad} + \underline{\quad} & = & \boxed{}
 \end{array}$$

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Complete each example. Did you regroup? Circle yes or no.

$\begin{array}{r} 124 \\ \times 2 \\ \hline 248 \end{array}$	$\begin{array}{r} 23 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 424 \\ \times 6 \\ \hline \end{array}$	$\begin{array}{r} 32 \\ \times 3 \\ \hline \end{array}$	$\begin{array}{r} 135 \\ \times 5 \\ \hline \end{array}$
yes (no)	yes no	yes no	yes no	yes no

Complete the examples below.

$$\begin{array}{r} 42 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 630 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 27 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 34 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 226 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 328 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 465 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 814 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 726 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 138 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 743 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 801 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} 39 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 75 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} 211 \\ \times 6 \\ \hline \end{array}$$

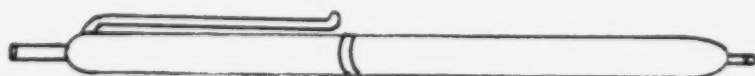
Do you remember?

Measure each item below to the nearest $\frac{1}{4}$ inch.

_____ inches



_____ inches



_____ inches

NAME: _____ CLASS: _____ DATE: _____

Solve the word problems below.

Students at a school in Albany, New York performed in a rock concert to raise money for starving people in Africa. If 613 families each bought 3 tickets, how many tickets were sold for the concert?

solve

An apple orchard in New Paltz, New York sold 274 baskets of apples. Each basket had 9 apples. How many apples were sold in all?

solve

One day 829 cars arrived with skiers in Lake Placid, New York. Each car carried 4 skiers. How many people were on the ski slopes that day?

solve

Pat's class of 34 students picked strawberries at a farm in Riverhead, Long Island. If each student picked 3 quarts of strawberries, how many quarts were picked by the class?

solve**CHALLENGE!**

The 4th grade students from a school in the Bronx visited the N.Y. Aquarium in Coney Island.

5 classes, each with 32 students, went on the trip. The trip cost \$3 per student.

How many students went to the N.Y. Aquarium? _____

How much did the trip cost in all? _____

4.05.01 PROPERTIES OF DIVISION

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

4.05.01.01A

use one (1) as a divisor;
e.g.,

$$\begin{array}{r} 7 \\ 1 \overline{)7} \end{array}$$

$$7 \div 1 = 7$$

$$\frac{7}{1} = 7$$

check

$$1 \times 7 = 7$$

4.05.01.02A

recognize that using zero as the divisor is
meaningless because the quotient will always
be undefined;
e.g.,

$$0 \overline{)12}$$

$$12 \div 0 = \square$$

$$\frac{12}{0} = \square$$

*4.05.01.03A

recognize that a dividend of zero divided by
any non-zero number will always have a
quotient of zero.
e.g.,

$$10 \overline{)0}$$

$$28 \overline{)0}$$

$$362 \overline{)0}$$

4.05.01

VOCABULARY

TERMS

dividend
divisor
quotient

GETTING STARTED 1:

Prepare a set of flash cards for division facts through $81 \div 9$.

e.g.,

$$4 \overline{)16}$$

$$25 \div 5 = \square$$

Write a word problem on the chalkboard and ask a student to read it aloud.

e.g.,

Mr. Brown planted 20 trees in 4 equal rows. How many trees are in each row?

Say, "What do we want to find out in this problem? (We want to find out how many trees are in each row.) How can we solve this problem? (We can divide 20 by 4.) How do you know?" (When we want to separate an amount into equal groups, we divide.) Ask a student to write the division example on the chalkboard and solve it. Say, "How much is 20 divided by 4? (20 divided by 4 equals 5.) How many trees were planted in each row?" (5 trees were planted in each row.)

Distribute a flash card to each student or group of students. Say, "Look at the division sentence on your flash card. Create a word problem related to that division fact. Write the problem in your notebook and solve it." When the students have written and solved their problems, they may take turns reading their problems aloud and asking other students to solve them.

4.05.01

GETTING STARTED 2:

Draw two squares on the chalkboard. Place a magnetic disc, or a circle backed with tape, inside each square.

e.g.,



Say, "How many groups are there? (There are 2 groups.) How many objects are in each group? (There is 1 object in each group.) What multiplication sentence represents 2 groups of 1?" Ask a student to write the multiplication sentence on the chalkboard.

e.g.



$$2 \times 1 = 1$$

Repeat this procedure for 3 groups of 1, 4 groups of 1, and 5 groups of 1. Say, "What do you notice about each group of objects? (Each group has the same number of objects.) How is each multiplication sentence the same? (Each multiplication sentence has 1 as a factor.) What can we say about the product of any number multiplied by 1?" (The product of any number multiplied by 1 is that number.)

Draw 2 squares on the chalkboard. Do not place any discs in the squares. Say, "How many groups are there? (There are 2 groups.) How many objects are in each group?" (There are zero objects in each group.) Ask a student to write a multiplication sentence to show two groups of zero objects on the chalkboard.

e.g.,



$$2 \times 0 = 0$$

Say, "If there are 2 groups with zero objects in each group, how many objects are there?" (There are zero objects.)

Repeat this procedure for 3 groups of 0, 4 groups of 0, and 5 groups of 0. Say, "What do you notice about each group of objects? (Each group has 0 objects.) How is each multiplication sentence the same? (Each multiplication sentence has 0 as a factor.) What can we say about the product of any number multiplied by 0?" (The product of any number multiplied by 0 is 0.)

4.05.01

4.05.01.01 use one (1) as a divisor

STRATEGY 1: Prepare and distribute sets of chips (cubes, paper circles) to each student or group of students. Say, "Show 6 chips on your desk. How many stacks with 1 chip in each can you make with your 6 chips? (I can make 6 stacks with 1 chip in each.) What division fact does this represent?" Ask a student to say the division fact and write it two different ways on the chalkboard.

e.g.,

$$\begin{array}{r} 6 \\ 1 \overline{)6} \end{array} \quad 6 \div 1 = 6$$

Say, "There is another way to show division." On the chalkboard write $\frac{6}{1} = 6$. Say, "We can also read this as 6 divided by 1 equals 6." Label the dividend, divisor, and quotient in each example on the chalkboard.

e.g.,

$$\begin{array}{c} \text{quotient} \\ \downarrow \\ \frac{6}{1} \\ \uparrow \\ \text{dividend} \end{array} \quad \text{divisor} \rightarrow 1 \overline{)6}$$

dividend		divisor		quotient
6	÷	1	=	6

dividend	→	<u>6</u>	=	6	←	quotient
divisor	→	1				

Ask the students to write the examples in their notebooks. Repeat this activity with other groups of chips to elicit other division facts where one is the divisor. Say, "Look at the quotients and the dividends in each division fact. What do you notice? (The quotient matches the dividend in each division

4.05.01

STRATEGY 1: case? (In each case the divisor was 1.) What can you say about the quotient whenever the divisor is 1?" (When the divisor is 1, the quotient will be the same as the dividend.)

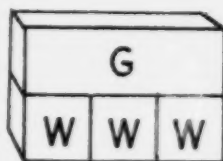
STRATEGY 2: Prepare and distribute colored rods to each student or group of students. Assign a numerical value to each rod and write each on the chalkboard.

e.g.,

white = 1	light green = 3
red = 2	purple = 4

Say, "What have we learned about 1 as a factor in multiplication? (The product of any number multiplied by 1 is that number.) What is the inverse operation of multiplication? (The inverse operation of multiplication is division.) If multiplying any number by 1 is equal to that number, then any number divided by 1 should also be equal to that number, since division and multiplication are inverse, or opposite, operations. Place a light green rod on your desk. How many white rods equal the light green rod?" (Three white rods equal the light green rod.)

e.g.,



Say, "What is the value of each light green rod? (Each light green rod has a value of 3.) What is the value of each white rod? (Each white rod has a value of 1.) We divided the light green rod into 3 equal groups of 1. How many groups of 1 are there in 3? (There are 3 groups of 1 in 3.) What division fact could we write to represent this?" Ask a student to say the division fact and to write it two different ways on the chalkboard.

4.05.01

STRATEGY 2: e.g.,

cont'd

$$\begin{array}{r} 3 \\ 3 \overline{)3} \end{array}$$

$$3 \div 1 = 3$$

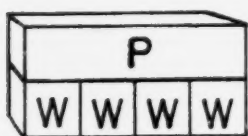
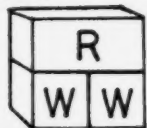
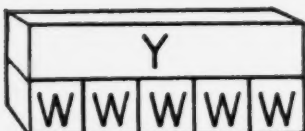
Say, "We can write about division another way." On the chalkboard write $\frac{3}{1} = 3$ and identify the dividend, divisor, and quotient.

e.g.,

$$\begin{array}{l} \text{dividend} \longrightarrow \underline{3} = 3 \longleftarrow \text{quotient} \\ \text{divisor} \longrightarrow 1 \end{array}$$

Repeat this procedure using other colored rods. As each division fact is named, ask a student to write it on the chalkboard three different ways. Ask another student to identify the dividend, divisor, and quotient in each division fact.

e.g.,

	$\begin{array}{r} 4 \\ 1 \overline{)4} \end{array}$	$4 \div 1 = 4$	$\frac{4}{1} = 4$
	$\begin{array}{r} 2 \\ 1 \overline{)2} \end{array}$	$2 \div 1 = 2$	$\frac{2}{1} = 2$
	$\begin{array}{r} 5 \\ 1 \overline{)5} \end{array}$	$5 \div 1 = 5$	$\frac{5}{1} = 5$

Say, "Look at each division fact. What do you notice about each divisor? (Each divisor is 1.) What do you notice about each dividend and quotient? (The dividend and quotient in each division fact are the same.) What can we say about dividing any number by 1?" (Any number divided by 1 is equal to that number.)

4.05.01

- 4.05.01.02 recognize that using zero as the divisor is meaningless because the quotient will always be undefined

STRATEGY 1: Write a division fact on the chalkboard, e.g., $3\overline{)6}$. Ask a student to read the example aloud. Say, "What is missing in this example? (The quotient is missing.) How can we find the quotient? (We can divide 6 into equal groups of 3.) We can also solve this example by relating division to multiplication." On the chalkboard write $\square \times 3 = 6$. Say, "We can say that some number times 3 equals 6. What number times 3 equals 6?" (2 times 3 equals 6.) Ask a student to complete the example on the chalkboard.
e.g.,

$$\begin{array}{r} 2 \\ 3\overline{)6} \end{array}$$

$$\square \times 3 = 6$$

Repeat this procedure for other division facts.
e.g.,

$$\begin{array}{r} 4 \\ 2\overline{)8} \end{array}$$

$$\square \times 2 = 8$$

On the chalkboard write $0\overline{)3}$ and $\square \times 3 = 0$. Say, "What number when multiplied by zero will equal 3? (There is no number that can be multiplied by zero that will equal 3.) Why? (When zero is a factor, the product is always zero. Therefore, the product cannot be 3.) We say that dividing by zero is undefined. We cannot find a quotient when we try to divide by zero."

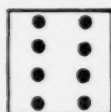
- 4.05.01.03 recognize that a dividend of zero divided by any non-zero number will always have a quotient of zero

STRATEGY 1: Prepare and display a set of magnetic discs or paper discs backed with tape. Draw a large square on the

4.05.01

STRATEGY 1: chalkboard. Place 8 magnetic discs inside the square.
cont'd

e.g.,



Ask a student to come to the chalkboard and separate the discs into equal groups of 4.

e.g.,



Say, "How many discs are there in all? (There are 8 discs altogether.) How many groups are there? (There are 2 groups.) How many discs are in each group?" (There are 4 discs in each group.) Ask a student to write a corresponding division fact for the groups of objects on the chalkboard.

e.g.,

$$\begin{array}{r} 2 \\ 4 \overline{)8} \end{array} \quad \text{or} \quad 8 \div 4 = 2 \quad \text{or} \quad \frac{8}{4} = 2$$

Repeat this procedure for separating 6 discs into equal groups of 3.

Remove all of the discs from the chalkboard. Leave the outline of the square on the chalkboard. Say, "How many discs do we have? (We have zero discs.) Can we separate zero discs into equal groups of 3? (No, we cannot separate zero objects into equal groups of 3.) Why? (There are no objects to separate.) We can represent zero objects separated into equal groups of 3 with a division fact." On the chalkboard write $3 \overline{)0}$.

Say, "How much is zero divided by 3?" (0 divided by 3 is equal to 0.) Ask a student to write the quotient in the example and to write the example two other ways.

e.g.,

$$\begin{array}{r} 0 \\ 3 \overline{)0} \end{array} \quad 0 \div 3 = 0 \quad \frac{0}{3} = 0$$

$$0 - 268.5 = 256$$

4.05.01

STRATEGY 1: Say, "How can we check to see if the quotient is correct?" (We can multiply the quotient and the divisor. If the result is equal to the dividend, the quotient is correct.) Ask a student to check at the chalkboard.
e.g., $0 \times 3 = 0$

Say, "When you multiplied the quotient and the divisor, the result was the dividend. Therefore, we know the answer, 0, is correct."

Repeat this procedure using other non-zero divisors with dividends of zero. Say, "What did you notice when 0 was the dividend?" (When 0 was the dividend, the quotient was always 0.)

STRATEGY 2: Adapt Strategy 1, P.O.4.05.01.02.

NAME: _____ CLASS: _____ DATE: _____

Find each quotient and check.

$$\begin{array}{r} \text{check} \\ 1 \overline{)10} \\ 10 \times 1 = 10 \end{array}$$

$$\frac{10}{1} = 10 \quad \begin{array}{r} \text{check} \\ 10 \times 1 = 10 \end{array}$$

$$10 \div 1 = 10 \quad \begin{array}{r} \text{check} \\ 10 \times 1 = 10 \end{array}$$



Remember: When a number is divided by 1, the quotient is the same as that number.

$$1. \quad \begin{array}{r} \text{check} \\ 1 \overline{)8} \\ 8 \times 1 = 8 \end{array}$$

$$2. \quad 1 \overline{)12}$$

check

$$3. \quad 1 \overline{)15}$$

check

$$4. \quad 1 \overline{)9}$$

check

$$5. \quad 7 \div 1 = \square$$

check

$$6. \quad 11 \div 1 = \square$$

check

$$7. \quad 5 \div 1 = \square$$

check

$$8. \quad 14 \div 1 = \square$$

check

$$9. \quad \frac{19}{1} = \square$$

check

$$10. \quad \frac{35}{1} = \square$$

check

Do you remember?

10 hundreds = ____ thousand

4 thousand = ____ hundreds

30 hundreds = ____ thousand

1 thousand = ____ hundreds

90 hundreds = ____ thousand

7 thousand = ____ hundreds

NAME: _____ CLASS: _____ DATE: _____

Solve the examples where division is possible. Place an X on the examples where division is not possible.

Dividing by 0

~~$$0 \overline{) 8}$$~~

~~$$8 \div 0 = \square$$~~

We cannot divide by 0.

Dividing into 0

$$12 \overline{) 0}$$

$$0 \div 12 = 0$$

The quotient is always 0.

1. $0 \overline{) 16}$

2. $10 \overline{) 0}$

3. $0 \div 26 = \square$

4. $0 \overline{) 11}$

5. $0 \div 13 = \square$

6. $0 \overline{) 25}$

7. $0 \div 17 = \square$

8. $49 \overline{) 0}$

9. $0 \overline{) 32}$

10. $21 \overline{) 0}$

11. $21 \div 0 = \square$

12. $15 \overline{) 0}$

13. $130 \overline{) 0}$

14. $0 \overline{) 240}$

15. $0 \div 315 = \square$

CHALLENGE!

Alice, Bob, and Carol live on the same block. Bob lives next door to Alice. Alice does not live next door to Carol. Carol does not live in the house on the right. Write each person's name on the line below his/her house.

SHARPENING YOUR SKILLS

Units 20, 21

Name: _____

Class: _____

Date: _____

1. $7 \times 10 = \square$

(a) 7

(c) 700

(b) 70

(d) Not Here

2. $\square \times 100 = 300$

(e) 30

(g) 200

(f) 10

(h) Not Here

3. $5 \times 50 = \square$

(a) 25

(c) 250

(b) 2,500

(d) Not Here

4. $\square \times 300 = 1,200$

(e) 3

(g) 40

(f) 4

(h) Not Here

5. $6 \times 42 = 6 \times (\square + 2)$

(a) 42

(c) 4

(b) 40

(d) Not Here

6. Complete the following:

$$\begin{aligned} 3 \times 17 &= 3 \times (10 + 7) \\ &= (3 \times \underline{\quad}) + (3 \times \underline{\quad}) \\ &= \underline{\quad} + \underline{\quad} \\ &= \underline{\quad} \end{aligned}$$

7. $\begin{array}{r} 24 \\ \times 2 \\ \hline \end{array}$

(e) 28

(g) 48

(f) 42

(h) Not Here

8. Multiply.

$$\begin{array}{r} 321 \\ \times 3 \\ \hline \end{array}$$

9. Find the product.

$$\begin{array}{r} 27 \\ \times 3 \\ \hline \end{array}$$

10. Multiply.

$$\begin{array}{r} 426 \\ \times 5 \\ \hline \end{array}$$

11. $6 \div \square = 6$

(a) 6

(c) 0

(b) 1

(d) Not Here

12. Which example cannot be solved?

(e) $0 \div 4 = \square$

(g) $0 \div 9 = \square$

(f) $0 \overline{)5}$

(h) $6 \overline{)0}$

13. On Friday 245 people borrowed books from the library. On Saturday 3 times as many people borrowed books. How many people borrowed books on Saturday?

_____ people

Unit 22

4.05.02 DIVISION OF A 2- AND 3-DIGIT DIVIDEND BY A 1-DIGIT
DIVISOR WITHOUT REGROUPING

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

- 4.05.02.01A recognize a remainder as that which is "left over" in division;
e.g.,

$$\begin{array}{r} 4 \text{ R}1 \\ 3 \overline{)13} \\ -12 \\ \hline 1 \end{array}$$

- *4.05.02.02A estimate the quotients for division examples;
e.g.,

$$2 \overline{)48} \quad \text{estimate} = 20$$

$$3 \overline{)966} \quad \text{estimate} = 300$$

- *4.05.02.03A divide a 2- or 3-digit dividend by a 1-digit divisor without regrouping (exchange) or a remainder and check;
e.g.,

$$\begin{array}{r} 24 \\ 2 \overline{)48} \end{array}$$

$$\begin{array}{r} \text{check} \\ 24 \\ \times 2 \\ \hline 48 \end{array}$$

$$\begin{array}{r} 322 \\ 3 \overline{)966} \end{array}$$

$$\begin{array}{r} \text{check} \\ 322 \\ \times 3 \\ \hline 966 \end{array}$$

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4.05.02.04A

divide a 2- or 3-digit dividend by a 1-digit divisor without regrouping (exchange) with a remainder and check;

e.g.,

$$\begin{array}{r} \underline{22} \text{ R1} \\ 2 \overline{)45} \end{array} \quad \begin{array}{r} \text{check} \\ 22 \\ \times 2 \\ \hline 44 \\ + 1 \\ \hline 45 \end{array}$$

$$\begin{array}{r} \underline{231} \text{ R1} \\ 2 \overline{)463} \end{array} \quad \begin{array}{r} \text{check} \\ 231 \\ \times 2 \\ \hline 462 \\ + 1 \\ \hline 463 \end{array}$$

4.05.02.05A

solve word problems related to skills learned in this module.

e.g.,

There are 693 donuts to be packed in boxes. If 3 donuts are placed in each box, how many boxes are needed?

VOCABULARY

divisor
dividend
quotient
remainder

GETTING STARTED 1:

Prepare and distribute to each student several oaktag numeral cards, each with a different numeral from 0 through 9.

e.g.,

6	3	8
---	---	---

Divide the students into two teams. Say, "Today we will recall division facts. I will read a division problem. If you are holding a numeral card with the answer to the problem, say the division example and display the card. Each time you respond correctly, your team will score a point."

e.g.,

- Rosa picked 42 peaches at a peach orchard in Georgia. She shared the peaches among her 6 brothers. How many peaches did each of Rosa's brothers get?
- There were 6 sailboats and 30 sailors on a race from New York City to Bermuda. Each sailboat carried an equal number of sailors. How many sailors were on each boat?

Continue playing the game until sufficient practice has been given or until one team scores 10 points.

GETTING STARTED 2:

Prepare and display the following chart:

2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90

Say, "This is a chart of multiples. The numbers in each of the rows are multiples of the first number in the row. This chart can help us review our multiplication and division facts." On the chalkboard write $6 \times 7 = \square$. Say, "To find the product for 6 groups of 7, look at the row beginning with 7 and count 6 boxes including the first box. On which box did you stop? (I stopped at 42.) We have found that 6 times 7 equals 42."

On the chalkboard write $9 \overline{)54}$. Say, "To find the quotient for 54 divided by 9, look at the row with multiples of 9 and, beginning with 9, count how many boxes we use to reach 54. How many boxes did you count? (I counted 6 nines.) Since each box represents another 9, there are 6 nines in 54." Ask a student to write the quotient in the example.

Repeat this procedure, using the chart to review other multiplication and division facts.

4.05.02

4.05.02.01 recognize a remainder as that which is "left over" in division

STRATEGY 1: Prepare and distribute 81 chips (sticks, beans, ones pieces) to groups of students. Say, "Count out 18 chips. We will divide these chips into groups of 5." Ask a student to write a division example for 18 divided by 5 on the chalkboard, e.g., $5\overline{)18}$. Say, "Separate your 18 chips into groups of 5. How many groups of 5 did you make? (I made 3 groups of 5.) How many chips did you use? (I used 15 chips.) How many chips are left over? (I have 3 chips left over.) Why are there 3 chips left over? (3 chips are left over because 18 cannot be divided evenly by 5.) The closest number to 18, without going beyond 18, that can be divided evenly by 5 is 15. The 3 chips left over represent the difference between 15 and 18."

Write the quotient, 3, in the example on the chalkboard. Say, "When we made 3 groups with 5 chips in each, how many chips did we use? (We used 15 chips.) How many chips were left over?" (3 chips were left over.)

e.g.,

$$\begin{array}{r} 3 \\ 5\overline{)18} \\ \underline{-15} \text{ chips used} \\ 3 \text{ chips left over} \end{array}$$

Say, "In our example we divided, multiplied, and subtracted to see how many chips were left over. We call the amount left over the remainder. It must always be less than the divisor. We write the remainder near the quotient, using the letter R to represent the word remainder."

e.g.,

$$\begin{array}{r} 3 \text{ R}3 \\ 5\overline{)18} \\ \underline{-15} \text{ chips used} \\ 3 \text{ chips left over.} \end{array}$$

4.05.02

STRATEGY 1: Ask the students to write the example in their notebooks. Repeat this procedure with other examples.

STRATEGY 2: Display the chart with multiples of the numbers 2 through 9 prepared in Getting Started 2. Say, "We used this chart to help us review our multiplication and division facts. We can use it to solve other division examples." On the chalkboard write $5 \overline{)21}$. Say, "How did we use the chart to find a quotient?" (We looked at the row that began with the same number as the divisor. We counted how many multiples of that number were needed to reach the box with the same number as the dividend. The number of multiples we counted became the quotient.) To find the quotient for 21 divided by 5, in which row will we look? (We will look in the row that shows multiples of 5.) We will count how many multiples of 5 we need to reach 21. Look across the row. 21 is not there because it is not a multiple of 5. With a dividend of 21, we look for the closest multiple of 5 without going over 21. Which multiple of 5 will that be? (20 is the multiple of 5 that is closest to 21 without going over.) How many fives do we count to reach 20?" (We count 4 fives to reach 20.) Write 4 in the quotient.

Show the multiplication in the algorithm.

e.g.,
$$\begin{array}{r} 4 \\ 5 \overline{)21} \\ \underline{20} \end{array}$$

Say, "There are 4 groups of 5 in 21, however, 4 groups of 5 only accounts for 20. How can we determine how much is left over? (We can subtract to see how much is left over.)

e.g.,
$$\begin{array}{r} 4 \\ 5 \overline{)21} \\ \underline{-20} \\ 1 \text{ leftover} \end{array}$$

4.05.02

STRATEGY 2: The difference between 21 and 20 is 1. We could not make another group of 5 with that 1. We call the 1 that is left over the remainder and we write it at the top of the example near the quotient. We use the letter R to represent the word remainder."

e.g.,

$$\begin{array}{r} 4 \text{ R}1 \\ 5 \overline{)21} \\ \underline{-20} \\ 1 \text{ leftover} \end{array}$$

Repeat this procedure with similar examples.

4.05.02.02 estimate the quotients for division examples

STRATEGY 1: Prepare and distribute squared material (hundreds and tens) to each student or group of students. On the chalkboard write $2\overline{)86}$. Say, "This example is different from other division examples we have solved. We have computed division facts and "near facts" with remainders. There is no fact we have learned for 86 divided by 2. Before we solve this type of division example, we will learn to estimate about what the quotient will be. In division, we begin dividing in the place with the highest value in the dividend. With which place value will we begin in this example? (We will begin dividing the tens.) Why? (The tens place is the highest place value in this dividend.) How many tens are there in the dividend? (There are 8 tens in the dividend.) If we divide 8 tens, or 80, by 2, we will have an estimate of the quotient for 86 divided by 2."

Say, "Place 8 tens on your desk. What is the divisor in our example? (The divisor is 2.) What does a divisor of 2 tell us to do? (A divisor of 2 tells us to make 2 equal groups with the amount in the dividend. It can also mean to make groups of 2 with the amount in the dividend.) We will divide the 8 tens into 2 equal groups." After the students have made 2 equal groups, say, "How many tens are in each

4.05.02

STRATEGY 1:

cont'd

group? (There are 4 tens, or 40, in each of the 2 equal groups.) Look at our original example. Where shall we write the 4 to represent 4 tens in each group?" (We will write the 4 in the tens column in the quotient.) Ask a student to write the 4 in the tens column in the quotient and say, "Have we completed the example? (No, we have only divided the tens to estimate the quotient.) Since we know the quotient begins in the tens place, how many places must the quotient have?" (The quotient must have two places, tens and ones.) Draw a line in the ones place in the quotient to represent the rest of the quotient.

e.g.,

$$\begin{array}{r} 4 \\ 2\overline{)86} \end{array}$$

Say, "To estimate the quotient, we can use the first digit in the quotient and place a zero in each remaining place in the quotient. What will be an estimate for 86 divided by 2?" (An estimate of the quotient for 86 divided by 2 is 40.) On the chalkboard write: estimate = 40.

Say, "Finding an estimate gives us an idea of about what the quotient will be when we go on to solve the example. What number do we divide when we estimate in division? (We divide the number in the highest place value in the dividend.) How does this help us?" (It helps us know how many digits will be in the quotient and about what the quotient will be.)

Repeat this procedure with other 2- and 3-digit numbers.

4.05.02.03

divide a 2- or 3-digit dividend by a 1-digit divisor without regrouping (exchange) or a remainder and check

STRATEGY 1:

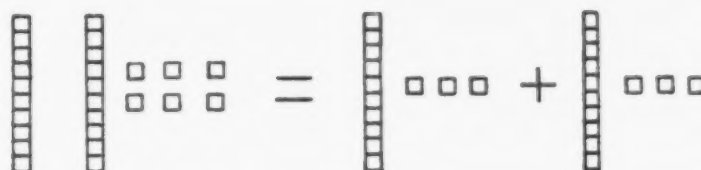
Prepare and display a demonstration set of squared material (hundreds, tens, and ones). Write the

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4.05.02

STRATEGY 1: following example on the chalkboard: $2\overline{)26}$. Ask a student to read the example. Ask another student to identify the divisor and dividend. Say, "What are we looking for in this example? (We are looking for the quotient.) What is a good estimate of the quotient?" (Our estimate of the quotient is 10.) On the chalkboard write: estimate = 10. Say, "In which place will we begin dividing? (We will begin dividing in the tens place.) Why? (Tens place has the highest place value in the dividend.) Use your squared material to show 26 divided into 2 equal groups."

e.g.,



Say, "How many tens are in each group? (There is 1 ten in each group.) How will we write this in the quotient?" (We will write the 1 in the tens place in the quotient.) Ask a student to write a 1 in the tens place in the quotient in the example on the chalkboard. Ask the students to do the same in their notebooks.

e.g.,

$$\begin{array}{r} 1 \\ 2\overline{)26} \end{array}$$

Say, "We used 1 ten in each of 2 groups. How many tens did we use in all?" (We used 2 tens in all.) Record the 20 at the chalkboard to show that 2 tens have been equally shared and complete the subtraction. Ask the students to do the same in their notebooks.

e.g.,

$$\begin{array}{r} 1 \\ 2\overline{)26} \\ -20 \\ \hline 6 \end{array} \longrightarrow (2 \times 10)$$

4.05.02

STRATEGY 1: Say, "Are there any tens left to be divided? (There are no tens left to be divided.) How many ones need to be divided? (6 ones need to be divided.) When you used your squared material to divide the 6 ones into 2 equal groups how many ones were in each group? (There were 3 ones in each group.) How will we write this in the quotient?" (We will write the 3 in the ones place.) Ask a student to write a 3 in the ones place in the example on the chalkboard as the other students do the same in their notebooks.

e.g.,

$$\begin{array}{r} 13 \\ 2 \overline{)26} \\ \underline{-20} \longrightarrow (2 \times 10) \\ 6 \end{array}$$

Say, "We have 3 ones in each of the 2 groups. How many ones did we use in all?" (We used 6 ones in all.) Record the 6 to show that 2 groups of 3 ones have been used and complete the subtraction. Ask the students to do the same in their notebooks.

e.g.,

$$\begin{array}{r} 13 \\ 2 \overline{)26} \\ \underline{-20} \longrightarrow (2 \times 10) \\ 6 \\ \underline{-6} \longrightarrow (2 \times 3) \\ 0 \end{array}$$

Say, "How many tens are in each group? (Each group has 1 ten.) How many ones are in each group? (Each group has 3 ones.) How much is 26 divided by 2? (26 divided by 2 is 13.) How does 13 compare to our estimate? (It is close to our estimate so 13 is a reasonable answer.) How can we check our answer?" (We can multiply the quotient by the divisor.) Ask a student to check the division on the chalkboard while the other students check the division in their notebooks.

e.g.,

$$\begin{array}{r} 13 \\ 2 \overline{)26} \\ \underline{-20} \longrightarrow (2 \times 10) \\ 6 \\ \underline{-6} \longrightarrow (2 \times 3) \\ 0 \end{array}$$

check

$$\begin{array}{r} 13 \\ \times 2 \\ \hline 26 \end{array}$$

4.05.02

STRATEGY 1: Repeat this procedure with other 2-digit and 3-digit dividends requiring neither regrouping nor renaming.
cont'd

NOTE: Students should become familiar with various ways of interpreting the division algorithm.

e.g.,

$$2 \overline{)26}$$

- How much is 26 divided by 2?
- If we divided 26 into 2 equal groups, how many will be in each group?
- If we divide 26 into groups of 2, how many groups will there be? (How many twos are in 26)

Furthermore, when students understand the process of division, they should be encouraged to use the short form of division.

e.g.,
$$\begin{array}{r} 13 \\ 2 \overline{)26} \end{array}$$

STRATEGY 2: Write a division example on the chalkboard, e.g., $3 \overline{)69}$.

Say, "If we have 6 tens to divide equally into 3 groups, how many tens will be in each group?" (There will be 2 tens in each group.) Write a 2 in the quotient in the tens place. Say, "Now that we know the first digit in the quotient we can estimate the answer. What is your estimate?" (My estimate is 20.) On the chalkboard write: estimate = 20. Say, "We used 2 tens in each of 3 groups. How many tens were used in all?" (6 tens were used in all.) Show this computation in the example on the chalkboard saying, "2 tens times 3 equals 6 tens."

e.g.,

tens	ones
2	
3) 6	9
6	

Say, "We had 6 tens to divide and we divided all 6 tens. There are no more tens to divide." Show the

53

4.05.02

STRATEGY 2: subtraction at the chalkboard. Draw an arrow to bring the 9 ones down to the line where we finished subtracting.

cont'd

e.g.,

tens	ones
2	
3) 6	9
-6	↓
0	9

Say, "We have 9 ones to divide into 3 groups. How many ones will be in each group?" (There will be 3 ones in each group.) Write a 3 in the ones place in the quotient.

e.g.,

tens	ones
2	3
3) 6	9
-6	↓
0	9

Repeat the multiplication and subtraction steps. Say, "How much is 69 divided by 3? (69 divided by 3 equals 23.) How does the quotient compare to the estimate? (It seems reasonable compared to the estimate.) How can we check the answer?" (Multiply the quotient and divisor to see if the result is the dividend.) Ask a student to check the example at the chalkboard as the other students write the example and the check in their notebooks.

Repeat this procedure with other 2- and 3-digit dividends. See NOTE after Strategy 1.

4.05.02.04 divide a 2- or 3-digit dividend by a 1-digit divisor without regrouping (exchange) with a remainder and check

STRATEGY 1: Adapt Strategy 1, P.O. 4.05.02.01 using squared materials with examples such as the following:

$$2 \overline{)63}$$

$$3 \overline{)34}$$

$$2 \overline{)425}$$

$$3 \overline{)637}$$

4.05.02

STRATEGY 1: **NOTE:** The students should understand that the remainder refers to the amount of ones that could not be shared equally. The remainder is recorded in the quotient and added in the check.
e.g.,

$\begin{array}{r} 22 \text{ R1} \\ 2 \overline{)45} \end{array}$	$\begin{array}{r} \text{check} \\ 22 \\ \times 2 \\ \hline 44 \\ + 1 \text{ (Remainder)} \\ \hline 45 \end{array}$
--	--

STRATEGY 2: Adapt Strategy 2, P.O. 4.05.02.01 with examples such as the following:

$$2 \overline{)23} \quad 3 \overline{)67} \quad 2 \overline{)245} \quad 3 \overline{)364}$$

With this strategy reinforce the understanding that the remainder refers to the amount of ones that could not be equally divided. The remainder is recorded in the quotient and added in the check.
e.g.,

$\begin{array}{r} 11 \text{ R1} \\ 2 \overline{)23} \end{array}$	$\begin{array}{r} \text{check} \\ 11 \\ \times 2 \\ \hline 22 \\ + 1 \text{ (Remainder)} \\ \hline 23 \end{array}$
--	--

4.05.02.05 solve word problems related to skills learned in this module

STRATEGY 1: Write a word problem on the chalkboard and ask a student to read it aloud.
e.g.,

In the year 1910, 864 passengers from Greece arrived at Ellis Island in 2 ships. If the ships carried an equal number of people, how many passengers were on each ship?

STRATEGY 1:

cont'd

Say, "What do we want to find out in this problem? (We want to find out how many passengers were on each ship.) How many passengers arrived on Ellis Island in all? (864 passengers arrived on Ellis Island.) How many ships were there? (There were 2 ships.) How can we solve this problem? (We can separate the 864 passengers into 2 equal groups.) When we separate an amount into equal groups, what operation do we use?" (We divide.)

Ask a student to write the division example on the chalkboard.

e.g.,

$$2 \overline{)864}$$

Say, "What will be a good estimate of the quotient? (A good estimate is 400.) How did you determine this estimate?" (I determined this estimate by dividing 8 hundreds by 2.) Ask a student to write the estimate on the chalkboard. Ask another student to solve the example on the chalkboard step by step. Ask the other students to solve the example in their notebooks. When the example has been solved, compare the quotient to the estimate. Then ask a student to check the answer at the chalkboard as the other students check in their notebooks.

e.g.,

check

432

x2

864

Say, "What is the answer to the problem?" (432 passengers were on each ship.)

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Solve.

$$\begin{array}{r} 5 \text{ R1} \\ 4 \overline{)21} \end{array}$$

$$6 \overline{)19}$$

$$5 \overline{)18}$$

$$6 \overline{)32}$$

$$5 \overline{)42}$$

$$7 \overline{)50}$$

$$8 \overline{)26}$$

$$9 \overline{)82}$$

$$2 \overline{)11}$$

$$6 \overline{)38}$$

$$3 \overline{)29}$$

$$7 \overline{)58}$$

$$7 \overline{)25}$$

$$8 \overline{)50}$$

$$4 \overline{)39}$$

$$8 \overline{)27}$$

Estimate each quotient.

$$2 \overline{)26} \text{ estimate} = \underline{\hspace{2cm}}$$

$$3 \overline{)699} \text{ estimate} = \underline{\hspace{2cm}}$$

$$5 \overline{)55} \text{ estimate} = \underline{\hspace{2cm}}$$

$$3 \overline{)960} \text{ estimate} = \underline{\hspace{2cm}}$$

$$2 \overline{)86} \text{ estimate} = \underline{\hspace{2cm}}$$

$$2 \overline{)488} \text{ estimate} = \underline{\hspace{2cm}}$$

$$4 \overline{)88} \text{ estimate} = \underline{\hspace{2cm}}$$

$$4 \overline{)880} \text{ estimate} = \underline{\hspace{2cm}}$$

Do you remember?

$$14 + \boxed{} = 26$$

$$142 + \boxed{} = 159$$

$$25 - \boxed{} = 11$$

$$258 - \boxed{} = 157$$

$$\boxed{} + 23 + 45$$

$$\boxed{} + 30 = 160$$

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

1. <u>check</u> $\begin{array}{r} 13 \\ 2 \overline{) 26} \end{array}$ $\begin{array}{r} 13 \\ \times 2 \\ \hline 26 \end{array}$	2. <u>check</u> $4 \overline{) 848}$
3. <u>check</u> $3 \overline{) 66}$	4. <u>check</u> $5 \overline{) 555}$
5. <u>check</u> $4 \overline{) 84}$	6. <u>check</u> $2 \overline{) 426}$
7. <u>check</u> $2 \overline{) 68}$	8. <u>check</u> $2 \overline{) 884}$
Solve each problem and check.	
There were 468 free tickets to the circus to be divided among 2 schools. How many tickets will each school get?	<u>solve</u> <u>check</u> _____ tickets
John has 96 marbles. He wants to put the same amount into 3 containers. How many marbles will he put in each container?	<u>solve</u> <u>check</u> _____ marbles

NAME: _____ CLASS: _____ DATE: _____

Divide and check.



The remainder is
the amount that is
left over.

	<u>check</u>
12 R 1	12
2 $\overline{) 25}$	x 2
	24
	+ 1
	<u>25</u>

1. $3 \overline{) 34}$ check

2. $2 \overline{) 29}$ check

3. $4 \overline{) 45}$ check

4. $6 \overline{) 668}$ check

Solve each problem.

1. There are 247 balloons.
If two friends share the
balloons, how many will
each friend get?

solve

check

2. Jerry, Sam, and Charlie
collected 634 bottlecaps.
Each of the boys collected
the same amount. How many
bottlecaps did each boy
collect?

solve

check

_____ balloons

277

_____ bottlecaps

4.05.03 DIVISION OF A 2- AND 3-DIGIT DIVIDEND BY A 1-DIGIT
DIVISOR WITH REGROUPING
 (2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.05.03.01A

divide a 2- or 3-digit dividend by a 1-digit divisor regrouping tens as ones with or without a remainder and check;
 e.g.,

$$\begin{array}{r} 29 \\ 2 \overline{) 58} \end{array}$$

$$\begin{array}{r} \text{check} \\ 29 \\ \times 2 \\ \hline 58 \end{array}$$

$$\begin{array}{r} 214 \text{ R}1 \\ 3 \overline{) 643} \end{array}$$

$$\begin{array}{r} \text{check} \\ 214 \\ \times 3 \\ \hline 642 \\ + 1 \\ \hline 643 \end{array}$$

4.05.03.02A

divide a 3-digit dividend by a 1-digit divisor regrouping hundreds as tens and tens as ones with or without a remainder and check;
 e.g.,

$$\begin{array}{r} 264 \\ 3 \overline{) 792} \end{array}$$

$$\begin{array}{r} \text{check} \\ 264 \\ \times 3 \\ \hline 792 \end{array}$$

$$\begin{array}{r} 127 \text{ R}1 \\ 5 \overline{) 636} \end{array}$$

$$\begin{array}{r} \text{check} \\ 127 \\ \times 5 \\ \hline 635 \\ + 1 \\ \hline 636 \end{array}$$

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4.05.03.03A

use zero as a placeholder in a quotient;
e.g.,

$$918 \div 9 = 102 \quad \begin{array}{r} 102 \\ 9 \overline{)918} \end{array}$$

4.05.03.04A

solve word problems using skills learned in
this module.

e.g.,

There are 336 jellybeans in a jar.
Sue and Jack are to share them
equally. How many jellybeans will
each person get?

VOCABULARY

divisor
dividend
quotient
remainder

GETTING STARTED 1:

Prepare flash cards for division facts. Divide the students into two groups to play Math Baseball.

Say, "Each time a player correctly answers a problem, he is awarded a single. If he answers his problem incorrectly, he is out. After three outs the team is retired. Then, the other team bats. The team with the most runs at the end of the game is the winner."

GETTING STARTED 2:

Write a series of division examples in four columns on the chalkboard. Label each column with the name of a team.

e.g.,

<u>Team A</u>	<u>Team B</u>	<u>Team C</u>	<u>Team D</u>
$3\overline{)19}$	$5\overline{)36}$	$2\overline{)15}$	$6\overline{)32}$
$4\overline{)27}$	$4\overline{)18}$	$8\overline{)17}$	$5\overline{)17}$
$2\overline{)17}$	$7\overline{)50}$	$9\overline{)47}$	$9\overline{)20}$
.	.	.	.
.	.	.	.
.	.	.	.

Divide the students into four teams to play Division Relay. Say, "I will ask the first student from each team to come to the chalkboard and solve the first example in his/her row. As soon as each student finishes an example, the next student on the team comes to the chalkboard and solves the next example in the row. The team that correctly completes all their examples first is the winner."

4.05.03

4.05.03.01 divide a 2- or 3-digit dividend by a 1-digit divisor regrouping tens as ones with or without a remainder and check

STRATEGY 1: Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Write a division example which requires regrouping tens as ones on the chalkboard, e.g., $2\overline{)34}$.

Ask a student to read the example aloud and to identify the divisor and the dividend. Say, "What would be a good estimated quotient for this example. (A good estimated quotient would be 10.) Why?" (When dividing 34 by 2, the digit in the tens place will be 1.) On the chalkboard write: estimate = 10. Say, "Use your squared material to represent 34." e.g.,



Say, "Divide the 3 tens into 2 equal groups. How many tens are in each group?" (There is 1 ten in each group and a ten left over.) Write 1 in the tens place in the quotient.

e.g.,
$$\begin{array}{r} 1 \\ 2\overline{)34} \end{array}$$

Say, "How much are 2 groups of ten?" (2 groups of ten equal 20.) Record the 20 to show that 2 tens have been divided into 2 equal groups of ten.

e.g.,
$$\begin{array}{r} 1 \\ 2\overline{)34} \\ \underline{-20} \end{array} \longrightarrow (2 \times 10)$$

Say, "We can divide this extra ten into 2 groups if we exchange it for 10 ones." Ask the students to exchange the 1 ten for 10 ones at their desks. Say, "How many ones do we have now?" (We have 14 ones.) At the chalkboard, subtract the 2 tens, or 20, which have already been divided.

4.05.03

STRATEGY 1: e.g.,

cont'd

$$\begin{array}{r} 1 \\ 2 \overline{)34} \\ -20 \\ \hline 14 \end{array} \longrightarrow (2 \times 10)$$

Say, "When we subtract what has already been divided, we can see how much remains to be divided. We have 14 ones in our example and we have 14 ones shown with the squared material at your desks. Divide the 14 ones into 2 equal groups. How many ones are in each group?" (There are 7 ones in each group.) Record the 7 in the ones place in the example on the chalkboard, multiply, and subtract.

e.g.,

$$\begin{array}{r} 17 \\ 2 \overline{)34} \\ -20 \\ \hline 14 \\ -14 \\ \hline 0 \end{array} \begin{array}{l} \longrightarrow (2 \times 10) \\ \longrightarrow (2 \times 7) \end{array}$$

Say, "How much is left to be divided? (There is nothing left to be divided.) What is the quotient?" (The quotient is 17.) Ask the students to copy the completed example in their notebooks. Say, "How can we check to see if our division is correct?" (We can check by multiplying the divisor by the quotient. The result should be the dividend.) Ask a student to check at the chalkboard as the other students check in their notebooks.

e.g.,

$$\begin{array}{r} \text{check} \\ 17 \\ \times 2 \\ \hline 34 \end{array}$$

Repeat this procedure with other 2- or 3-digit dividends, regrouping tens as ones.

NOTE: Once the concept is understood, the students may use the short form of division when dividing by a 1-digit divisor.

e.g., $\underline{28} R1$

$$2 \overline{)57}$$

- 30S.2 ²⁸²

STRATEGY 2: Write an example on the chalkboard, e.g., $4\overline{)64}$. Ask a student to read the example aloud. Say, "If we have 6 tens to divide into 4 equal groups, what will be a good estimate for our quotient? (A good estimate for our quotient is ten.) Why?" (With 6 tens to divide into 4 equal groups, the digit in the tens place in the quotient will be one. A zero in the remaining place gives us an estimate of ten.) Compute the multiplication and subtract.

e.g.,

tens	ones
1	
4) 6	4
-4	
2	

Say, "When we subtracted, we found 2 tens left over that could not be divided. Why did this happen? (2 is less than 4, so we cannot separate 2 things into 4 equal groups.) If we exchange the tens for ones, we can continue to divide. For how many ones can we exchange 2 tens? (2 tens can be exchanged for 20 ones.) How many ones will we have then?" (We will have 24 ones in all.) Show the regrouping in the algorithm by drawing an arrow and bringing down the 4 in the ones column.

e.g.,

tens	ones
1	
4) 6	4
-4	↓
2	4

Say, "Now we have 24 ones to divide into 4 equal groups. How many ones will be in each group?" (There will be 6 ones in each group.) Write 6 in the ones place in the quotient, then multiply and subtract.

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4.05.03

STRATEGY 2: e.g.,
cont'd

tens	ones
1	6
4) 6	4
-4	↓
2	4
-2	4
	0

Say, "We have completed our division. What is the quotient? (The quotient is 16.) Is it reasonable compared to our estimate? (Yes.) How can we check the quotient?" (We can multiply the quotient and the divisor and the result should be the dividend.) Ask a student to check the example at the chalkboard.
e.g.,

$$\begin{array}{r} \text{check} \\ 16 \\ \times 4 \\ \hline 64 \end{array}$$

Repeat this procedure with other examples having 2-or 3-digit dividends.

NOTE: When the students understand the concept, they should be encouraged to use the short form of division with 1-digit divisors.

e.g.,
$$\begin{array}{r} 16 \\ 4 \overline{) 64} \end{array}$$

4.05.03.02 divide a 3-digit dividend by a 1-digit divisor regrouping hundreds as tens and tens as ones with or without a remainder and check

STRATEGY 1: Adapt Strategy 1, P.O. 4.05.03.01 for use with division examples requiring regrouping of hundreds as tens and tens as ones.

STRATEGY 2: Adapt Strategy 1, P.O. 4.05.03.01 for use with 3-digit dividends requiring regrouping of hundreds as tens and tens as hundreds.

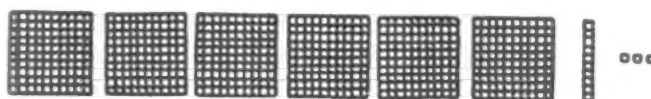
4.05.03

4.05.03.03 use zero as a place holder in a quotient

STRATEGY 1: Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. On the chalkboard write $3\overline{)613}$.

Ask a student to read the example aloud. Say, "What is the estimated quotient for the example? (The estimated quotient is 200.) Why? (If 6 hundreds are divided into 3 equal groups, there are 2 hundreds in each group. On the chalkboard write: estimate = 200. Say, "Use your squared material to show 613."

e.g.,



Say, "Divide 6 hundreds into 3 equal groups. How many hundreds are in each group?" (2 hundreds are in each group.) Ask a student to write a 2 in the hundreds place in the quotient.

e.g.,

$$\begin{array}{r} 2 \\ 3 \overline{)613} \end{array}$$

Ask another student to multiply and subtract to see what is left to be divided.

e.g.,

$$\begin{array}{r} 2 \\ 3 \overline{)613} \\ -600 \longrightarrow (3 \times 200) \\ \hline 13 \end{array}$$

Say, "How much is left to be divided? (13 is left to be divided.) How does that compare with your squared material? (We have 1 ten and 3 ones, or 13, to be divided. That equals the amount left to be divided in the example.) How many tens are there to be divided? (There is 1 ten to be divided.) If we divide 1 ten into 3 equal groups, how many tens will be in each group? (There will not be any tens

4.05.03

STRATEGY 1:
cont'd

because 1 is less than 3.) Since we will have no tens in the equal groups, we must write a zero in the tens place in the quotient." Ask a student to write a 0 in the tens place in the quotient. Say, "What must we do now?" (We must multiply 0 tens times 3 and subtract the product from 1.)

e.g.,

$$\begin{array}{r} 20 \\ 3 \overline{) 613} \\ -600 \longrightarrow (3 \times 200) \\ \hline 13 \\ -0 \longrightarrow (3 \times 0) \\ \hline 13 \end{array}$$

Say, "Exchange your ten for 10 ones. How many ones do you have now? (We have 13 ones.) That is the same as the amount left to be divided in the example. When we divide the 13 ones into 3 equal groups, how many ones will be in each group?" (4 ones will be in each group and 1 one will be left over.) Ask a student to write 4 in the ones column in the quotient. Say, "What must we do now?" (We must multiply 4 ones times 3 and subtract the product from 13.)

e.g.,

$$\begin{array}{r} 204 \\ 3 \overline{) 613} \\ -600 \longrightarrow (3 \times 200) \\ \hline 13 \\ -0 \longrightarrow (3 \times 0) \\ \hline 13 \\ -12 \longrightarrow (3 \times 4) \\ \hline 1 \end{array}$$

Say, "We have divided the hundreds, tens, and ones. Do you have any squared material left over? (Yes, I have 1 one left over.) Look at the last row in the example, it shows 1 left in the ones column, just as you have 1 one left with your squared material. What do we call the amount left over?" (We call it the remainder.) Ask a student to write the remainder near the quotient. Compare the quotient to the estimate and then ask a student to check the example.

4.05.03

STRATEGY 1: e.g.,

cont'd

$$\begin{array}{r}
 204 \text{ R1} \\
 3 \overline{) 613} \\
 \underline{-600} \longrightarrow (3 \times 200) \\
 13 \\
 \underline{-0} \longrightarrow (3 \times 0) \\
 13 \\
 \underline{-12} \longrightarrow (3 \times 4) \\
 1
 \end{array}$$

$$\begin{array}{r}
 \text{check} \\
 204 \\
 \times 3 \\
 \hline
 612 \\
 + 1 \\
 \hline
 613
 \end{array}$$

Repeat this procedure with other similar examples.
See NOTE after Strategy 1, P.O. 4.05.03.01.

STRATEGY 2: Write a division example on the chalkboard, e.g.,
5)525. Say, "If we divide 5 hundreds into 5 equal groups, how many hundreds will be in each group? (There will be 1 hundred in each group.) What is the estimated quotient?" (The quotient will be about 100.) Ask a student to write the estimate on the chalkboard. Ask another student to write 1 in the hundreds column, multiply, subtract, and bring down the digit in the tens place.

e.g.,

$$\begin{array}{r}
 1 \\
 5 \overline{) 525} \\
 \underline{-5} \downarrow \\
 02
 \end{array}$$

Say, "If we want to divide 2 tens into 5 equal groups, how many tens will be in each group? (There will not be any tens because 2 is less than 5.) When we cannot divide because the number is smaller than the divisor, we must write a 0 in that place value in the quotient." Ask a student to write the 0 in the quotient. Say, "How will you complete this step?" (I will multiply 0 tens times 5, subtract 0 from 2 and then bring down the digit in the ones place.)

e.g.,

$$\begin{array}{r}
 10 \\
 5 \overline{) 525} \\
 \underline{-5} \downarrow \\
 02 \\
 \underline{-0} \downarrow \\
 25
 \end{array}$$

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STRATEGY 2:

cont'd

Say, "After subtracting and bringing down the digit in the ones place, what is the value of the number we now have? (We have 25 ones to divide into 5 equal groups.) How many will be in each group?" (5 ones will be in each group.) Ask a student to write the 5 in the ones column in the quotient. Say, "How will you complete the example?" (I will multiply 5 groups of ones times 5 and subtract the product from 25.)

e.g.,

$$\begin{array}{r} 105 \\ 5 \overline{) 525} \\ \underline{-5} \\ 02 \\ \underline{-0} \\ 25 \\ \underline{-25} \\ 0 \end{array}$$

Say, "What is the quotient? (The quotient is 105.) Why is there no remainder?" (There is no remainder because the ones were divided evenly with nothing left over.) After comparing the quotient to the estimate, ask a student to check the quotient.

e.g.,

check

$$\begin{array}{r} 105 \\ \times 5 \\ \hline 525 \end{array}$$

Repeat this procedure with similar examples.

See NOTE after Strategy 1, P.O. 4.05.03.01.

4.05.03.04

solve word problems using skills learned in this module

STRATEGY 1:

Write the following word problem on the chalkboard or on a chart.

e.g.,

John sold 234 concert tickets for his school in two days. If he sold the same number of tickets each day, how many tickets did he sell each day?

4.05.03

STRATEGY 1: Ask a student to read the problem. Say, "What do we want to find out in this problem? (We want to find out how many tickets were sold each day.) How can we solve this problem?" (We can divide the 234 tickets into 2 equal groups.) Ask a student to write the division example on the chalkboard needed to solve this problem.

cont'd

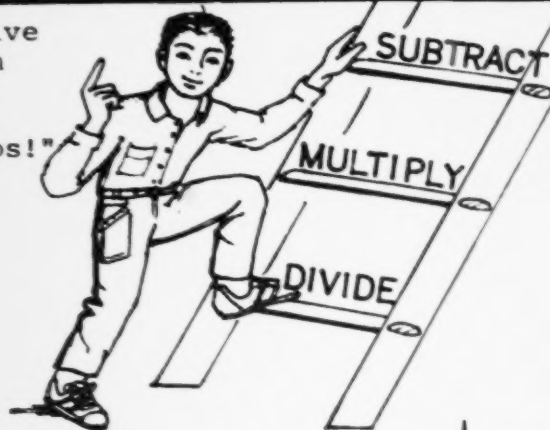
Say, "What is the estimated quotient?" (The estimate is 100.) On the chalkboard write estimate = 100 tickets. Ask a student to come up to the chalkboard, solve the example and explain the procedure used. Ask the other students to complete the example in their notebooks. When the example has been completed, ask the students to compare their results with the estimate. Then, ask the students to check their work. Ask one student to check the example at the chalkboard. Say, "What is the answer to the problem?" (John sold 117 tickets each day.)

Repeat this procedure with other word problems.

NAME: _____ CLASS: _____ DATE: _____

Solve and check each example.

"When I solve
a division
example,
I follow
these steps!"



$$\begin{array}{r} 18 \\ 2 \overline{)36} \end{array}$$

check

$$\begin{array}{r} 18 \\ \times 2 \\ \hline 36 \end{array}$$

1.) $3 \overline{)45}$

check

2.) $2 \overline{)54}$

check

3.) $5 \overline{)68}$

check

4.) $7 \overline{)91}$

check

5.) $2 \overline{)435}$

check

6.) $3 \overline{)648}$

check

NAME: _____ CLASS: _____ DATE: _____

Find each quotient. Check your answers.

1.

check

$$2 \overline{)354}$$

2.

check

$$3 \overline{)762}$$

3.

check

$$4 \overline{)536}$$

4.

check

$$5 \overline{)635}$$

5.

check

$$6 \overline{)804}$$

6.

check

$$7 \overline{)999}$$

CHALLENGE!

Do you see a pattern? Divide each example.

$$5 \overline{)35} \quad \begin{array}{c} 7 \\ \hline \end{array}$$

$$5 \overline{)350} \quad \begin{array}{c} 70 \\ \hline \end{array}$$

$$5 \overline{)3,500} \quad \begin{array}{c} 700 \\ \hline \end{array}$$

$$5 \overline{)35,000} \quad \begin{array}{c} 7000 \\ \hline \end{array}$$

$$4 \overline{)16}$$

$$4 \overline{)160}$$

$$4 \overline{)1,600}$$

$$4 \overline{)16,000}$$

$$7 \overline{)21}$$

$$7 \overline{)210}$$

$$7 \overline{)2,100}$$

$$7 \overline{)21,000}$$

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NAME: _____ CLASS: _____ DATE: _____

Solve each division example. Check your answers.

1. <u>check</u> $3 \overline{)315}$	2. <u>check</u> $2 \overline{)218}$	3. <u>check</u> $4 \overline{)416}$
4. <u>check</u> $3 \overline{)924}$	5. <u>check</u> $5 \overline{)530}$	6. <u>check</u> $2 \overline{)415}$
7. <u>check</u> $6 \overline{)624}$	8. <u>check</u> $4 \overline{)832}$ 292	9. <u>check</u> $5 \overline{)521}$

NAME: _____ CLASS: _____ DATE: _____

Solve each problem. Check your answer.

1. Joan has a piece of string that is 38 centimeters long. She wants to cut the string into 2 equal pieces. How long will each piece be? _____ cm	<u>solve</u> <u>check</u>
2. Matthew had 28 flower seeds. If he plants 5 seeds in each flower pot, how many pots can he fill? _____ pots	<u>solve</u> <u>check</u>
3. Miguel has a job packing 3 cans in each box. How many boxes will 375 cans fill? _____ boxes	<u>solve</u> <u>check</u>
4. Harry sold 314 candy bars in 2 days. If he sold the same amount on both days, how many did he sell on each day? _____ candy bars	<u>solve</u> <u>check</u>
5. Mr. and Mrs. Keyes drove 416 miles in 4 days. If they drove the same number of miles each day, how many miles did they drive in one day? _____ miles	<u>solve</u> <u>check</u>
6. There are 680 jellybeans in a jar. Five friends are going to share them equally. How many jellybeans will each friend get? _____ jellybeans	<u>solve</u> <u>check</u>

SHARPENING YOUR SKILLS

Units 22, 23

Name: _____

Class: _____ Date: _____

1. $3 \overline{)19}$

- (a) 6 (c) 6R2
(b) 6R1 (d) Not Here

2. $2 \overline{)64}$

- (e) 34 (g) 31
(f) 32 (h) Not Here

3. Which example could be used to check this division?

- $$\begin{array}{r} 121 \\ 4 \overline{)484} \end{array}$$

(a) $\begin{array}{r} 484 \\ \times 4 \end{array}$ (c) $\begin{array}{r} 121 \\ \times 4 \end{array}$
(b) $4 \overline{)121}$ (d) $\begin{array}{r} 484 \\ +121 \end{array}$

4. $5 \overline{)65}$

- (e) 11 (g) 13R1
(f) 13 (h) Not Here

5. Solve and check.

$7 \overline{)98}$ check

6. Solve and check.

$3 \overline{)375}$ check

7. $4 \overline{)528}$

- (a) 102 (c) 232
(b) 122 (d) Not Here

8. $3 \overline{)321}$

- (e) 17 (g) 107
(f) 170 (h) Not Here

9. It took Sally three weeks to read a book with 528 pages. If she read the same number of pages each week, how many pages did she read in one week?

_____ pages

10. Maria had 165 pennies in 4 equal stacks. How many were in each stack? How many were left over?

_____ pennies in each stack

_____ pennies left over

4.12.02 STATISTICS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*4.12.02.01A

find the mean (average) from given data;
e.g.,

The average of 124, 138 and 161 is:

$$\begin{array}{r} 124 \\ 138 \\ +161 \\ \hline 423 \end{array} \quad \begin{array}{r} 141 \\ 3 \overline{)423} \end{array}$$

mean (average) = 141

4.12.02.02A

solve word problems involving finding the
averages of given numbers;
e.g.,

Tommy borrowed a mystery book from
the library. He read 24 pages on
Monday, 18 pages on Tuesday, and 12
pages on Wednesday. Find the
average number of pages he read each
day.

4.12.02.03A

define the range as the difference between
the largest and the smallest numbers in a
set;
e.g.,

The results of the test scores were:
100, 95, 90, 85, 80, 75, 65, 60, 55
and 40.

$100 - 40 = 60$ is the range for this
class' test scores.

4.12.02.04B

identify the mode as the number that occurs most frequently.

e.g.,

Ted got the following grades on his tests:

100, 90, 90, 90, 85, 75.

The mode is 90 because it is the grade that occurred most frequently.

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VOCABULARY**TERMS**

data
tally
mean
average
mode
statistics

GETTING STARTED 1:

Prepare and display a set of 30 textbooks arranged in five stacks. Label the stacks A, B, C, D, and E respectively.

e.g.,



Ask the students to count each stack and record the number of books in each stack. Say, "Which stack has the greatest number of books? (Stack A has the greatest number, 10.) Which stacks have the fewest? (Stacks C and D have the fewest. Both have 4.) How many books are there in all? (There are 30 books in all.) How many more books are in stack A than stack B? (There are 3 more books in stack A than in stack B.) Besides listing the number of books in each stack, how else could we have shown this data, or information? (We could have shown the data on a bar graph, a line graph, a pictograph, ...)

GETTING STARTED 2:

List 5 current popular television shows on the chalkboard. Say, "We would like to collect some data concerning our choices of shows." Ask each student to name the show which is his/her favorite. Ask a student to tally the data next to each show as each student tells which show listed on the chalkboard is his/her favorite. After the tally is complete, ask a student to count the tallies and write the number of times each show was chosen. Say, "What show was chosen most frequently? ...least frequently?"

4.12.02

4.12.02.01 find the mean (average) from given data

STRATEGY 1: Prepare a set of 30 textbooks arranged in five stacks as shown in Getting Started 1. Say, "How many books are in each stack? (Stack A has 10, stack B has 7, stacks C and D each have 4, and stack E has 5.) Today we are going to find the average number of books in each stack. The average, or mean, tells us the number of books that would be in each stack if all the stacks were equal. Look at the five stacks of books. If we move some of the books from one stack to another so that each stack has the same number of books, guess how many books would be in each stack. Write down your guess." Ask a student to move books from stack to stack until all the stacks have an equal number of books. Say, "How many books are in each stack? (There are six books in each stack.) Six is called the average. Another word for the average is the mean. While it was easy to even off the stacks of books with small numbers, this gets rather difficult when the numbers become larger. Another way to find the mean, or the average, number of books in each stack is to find the total number of books and divide by the number of stacks." Ask a student to list on the chalkboard the number of books that were the original stacks and find the total.
e.g.,

A	B	C	D	E
10	7	4	4	5

$$10 + 7 + 4 + 4 + 5 = 30$$

Say, "How many books are there? (There are 30 books.) How many stacks are there?" (There are 5 stacks.) Ask a student to divide 30 by 5 on the chalkboard, e.g., $30 \text{ books} \div 5 \text{ stacks} = 6 \text{ books in each stack}$. Say, "6 is the same number we found when we moved the books from stack to stack. What does the mean tell us? (It tells us the number of books that would be in each stack if all the stacks were equal.)"

STRATEGY 1: Whenever we want to find the mean, or average, we can add to find the sum of all the items and then divide by the number of groups." On the chalkboard write:

Finding the Mean or Average

1. Find the sum of all the items in the group.
2. Divide the sum by the number of items in the group.

Repeat this procedure with other examples, asking the students to solve them in their notebooks.

4.12.02.02 solve word problems involving finding the averages of given numbers

STRATEGY 1: Prepare a set of word problems involving finding averages.

e.g.,

1. Marty made a table to show the amount of rainfall in Silver City for 5 months.

Rain in Silver City

Month	Inches of Rain
March	12"
April	14"
May	10"
June	8"
July	6"

Find the average rainfall in Silver City for the five months.

2. Janet took 3 mathematics tests. She scored 90 on the first test, 85 on the second test, and 95 on the third test. What was her average test score in mathematics?

Ask a student to read the first problem aloud. Say, "What does this problem ask us to find? (We are asked

STRATEGY 1: to find the average rainfall in Silver City for 5 months.) How can we find the average, or mean?" (We add to find the total number of inches of rain. Then we divide by the number of months.) Ask a student to solve the problem at the chalkboard while the other students solve it in their notebooks.

e.g.,

$$\begin{array}{r} 12 \\ 14 \\ 10 \\ 8 \\ + 6 \\ \hline 50 \end{array} \qquad \begin{array}{r} 10 \\ 5 \overline{)50} \end{array}$$

Say, "How many inches of rainfall were there in all? (There were 50 inches of rainfall in all.) What was the average rainfall? (The average rainfall was 10 inches.) What does the average tell us?" (It tells us the amount of rain that would fall monthly if the same amount fell each month.)

Repeat this procedure with other problems.

STRATEGY 2: Prepare a set of multi-step problems involving the average (mean). Display a problem and ask a student to read it aloud.

e.g.,

Mr. Michaels gave a test. Every student who received a mark equal to the average or above the average passed the test. Every student who received a mark below the average failed the test. The marks were 100, 80, 60, 70, 90, 95 and 65. Make a list showing which were passing marks and which were failing marks.

Say, "What do we have to find? (We have to find the passing marks and failing marks.) How can we solve this problem?" (First we must find the average mark and then compare each mark to the average.) Ask a student to solve the problem at the chalkboard as the other students solve it in their notebooks.

4.12.02

STRATEGY 2: e.g.,

cont'd

$$\begin{aligned}\text{average mark} &= (\text{sum of marks}) \div (\text{number of marks}) \\ &= (100 + 80 + 60 + 70 + 90 + 95 + 65) \div 7 \\ &= 560 \div 7 \\ &= 80\end{aligned}$$

Say, "What was the average mark? (The average mark was 80.) Which were passing marks? (100, 80, 90 and 95 were passing marks.) Which were failing marks?" (60, 65 and 70 were failing marks.)

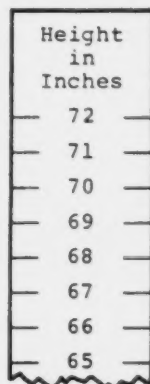
Repeat this procedure with other problems.

4.12.02.03

define the range as the difference between the largest and the smallest numbers in a set

STRATEGY 1: Prepare and display a height chart on the chalkboard or against the wall.

e.g.,



Ask several students to come to the height chart. Say, "We are going to compare the heights of these students." As each student is measured, ask another student to record the data on the chalkboard while the other students record the data in their notebooks.

e.g.,

54", 50", 60", 48", 51", 59", 49", 53"

Say, "What is the height of the tallest student in this group? (The tallest student's height is 60 inches.) What is the height of the shortest student in this group? (The shortest student's height is 48

4.12.02

STRATEGY 1: cont'd

inches.) If we listed the heights from shortest to tallest, where would all the other heights be? (They would be in between the shortest and the tallest.) What is the difference in height between the tallest and shortest student? (The difference is 12 inches.) That difference is called the range." Write on the chalkboard and say, "The range is the difference between the largest and smallest numbers in a list of data." Ask the students to read the definition of range aloud and to write it in their notebooks.

Say, "If the lowest mark on a test is 25 and the highest mark is 95, what is the range? (The range is 70.) How did you obtain this?" (Tallest height - shortest height = $95 - 25 = 70$.)

Repeat this procedure by asking the students to compute the range for other sets of data.

STRATEGY 2: Prepare and display a table showing the temperatures for the past week. e.g.,

Daily Temperatures for the Week of _____	
Sunday	65°
Monday	68°
Tuesday	74°
Wednesday	60°
Thursday	64°
Friday	65°
Saturday	57°

Say, "Look at the temperatures during that time. What was the warmest temperature? (The warmest temperature was 74°.) What was the coldest temperature?" (The coldest temperature was 57°.) Write on the chalkboard and say, "The range is the difference between the largest and smallest numbers in a set of data. What is the range in temperature for these two weeks? (The range is 17°.) How did

4.12.02

STRATEGY 2: you compute the range?" (We subtracted 57° from 74°.) Ask the student to record this information on the chalkboard as the other students write it in their notebooks.

cont'd

e.g.,

$$\begin{array}{rclcl} \text{Range} & = & \text{highest temperature} & - & \text{lowest temperature} \\ & = & 74 & - & 57 \\ & = & & & 17 \end{array}$$

Say, "How does knowing the range in temperature help us? (It helps us to see how the weather changes.) If the weatherman says the high temperature for the day will be 80°, but there will be a 20° range in temperature, what does that tell us? (It tells us that the lowest temperature will be about 60°.) How does that help us?" (If we know the range, we will know how to dress for the day. It may be cold in the morning, but warm in the afternoon.)

Repeat this procedure with other examples.

4.12.02.04 identify the mode as the number that occurs most frequently

STRATEGY 1: Prepare and display a chart showing the attendance each day for the last two weeks.

e.g.,

Attendance

Week 1

Mon.	Tues.	Wed.	Thurs.	Fri.
31	28	29	28	30

Week 2

Mon.	Tues.	Wed.	Thurs.	Fri.
28	28	27	29	31

Say, "We know how to average numbers and how to find the range of numbers. Today we will learn to find the mode." Write on the chalkboard and say, "The

4.12.02

STRATEGY 1: mode is the number that appears most often in a set of data."
cont'd

Say, "It is easy to find the mode if we look at the numbers in size order." Ask a student to list the numbers on the chalkboard in size order from least to greatest.

e.g.,

27, 28, 28, 28, 29, 29, 30, 31, 31

Ask the students to write the numbers in their notebooks and count how many times each number appears. Say, "Look at the amount of times each number appears. Which number appears most often? (28 appears most often.) We say that 28 is the mode in this set of data."

Repeat this procedure with other sets of data.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

1. Find the mean.

a)

32
25
15

mean = _____

b)

16
20
24
12

mean = _____

c)

219
132
20
153

mean = _____

2. The heights of the five starters on the Sparrows basketball team are 64", 70" 76", and 81". What is the average height of the players on the team?

The average height is _____.

3. Chris and his family want to move to a city where the average temperature is not less than 65 degrees. Here are the two month averages for five cities. Compute the yearly average for each city and tell Chris in which cities he can live.

Month	Seattle	Chicago	New York	Los Angeles	San Francisco
Jan. - Feb.	28°	29°	38°	66°	60°
March - April	53°	41°	63°	71°	65°
May - June	65°	66°	76°	83°	77°
July - August	79°	70°	87°	88°	83°
Sept. - Oct.	75°	55°	76°	78°	75°
Nov. - Dec.	60°	39°	50°	70°	66°

The cities to which Chris might move are _____

Do you remember?

11	11	11	11	12	12	12	12
<u>x 6</u>	<u>x 4</u>	<u>x 8</u>	<u>x 7</u>	<u>x 5</u>	<u>x 9</u>	<u>x 4</u>	<u>x 7</u>

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

1. Find the range for each set of numbers below.

a)	25	b)	825	c)	462
	36		716		1128
	77		429		199
	53		387		716
Range =	_____	Range =	_____	Range =	_____

2. Circle the group with the smallest range.

a)	211	b)	112	c)	825
	315		229		476
	825		538		152
	650		312		666

3. Which students have the greatest range in test scores?
Put a check next to their names.

Al	75, 90, 86, 35, 66, 71, 90
Betty	63, 72, 96, 42, 75, 80, 86
Connie	65, 87, 92, 39, 78, 88, 67
Dan	79, 89, 95, 40, 72, 89, 93

4. Below are the daily temperatures for one week. Find the mode.

<u>Sunday</u>	<u>Monday</u>	<u>Tuesday</u>	<u>Wednesday</u>	<u>Thursday</u>	<u>Friday</u>	<u>Saturday</u>
86°	84°	88°	84°	90°	84°	85°

Mode = _____

4.06.02 MULTIPLICATION OF FRACTIONS

(2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.06.02.01B

multiply fractions having values less than 1;

e.g.,

$$\frac{2}{3} \times \frac{1}{3} = \frac{2}{9}$$

$$\frac{3}{4} \times \frac{1}{5} = \frac{3}{20}$$

4.06.02.02B

rename any whole number as a fraction with a denominator of 1;

e.g.,

$$16 = \frac{16}{1}$$

$$2 = \frac{2}{1}$$

$$3 = \frac{3}{1}$$

4.06.02.03B

multiply a whole number by a fraction.

e.g.,

$$2 \times \frac{3}{8}$$

$$4 \times \frac{1}{5}$$

$$\frac{2}{1} \times \frac{3}{8} = \frac{6}{8}$$

$$\frac{4}{1} \times \frac{1}{5} = \frac{4}{5}$$

VOCABULARYTERMS

numerator
denominator

GETTING STARTED 1:

Prepare and distribute sets of fractional parts to each student or group of students. Include halves, thirds, fourths, and eighths.

Ask the students to put together a whole, using eighths. Say, "Hold up one eighth. What does it mean when we call this piece one eighth?" (It means that it is one part out of eight equal parts which make one whole.) Ask a student to write the fraction $\frac{1}{8}$ on the chalkboard. Say, "Hold up three eighths. What fraction of the whole are you holding?" (This is three eighths of the whole.) Ask a student to write the fraction $\frac{3}{8}$ on the chalkboard. Ask the students to write the fractions in their notebooks.

Repeat this procedure using other fractional parts.

GETTING STARTED 2:

Display an array on the chalkboard.

e.g.,



Say, "Look at this array. What multiplication number sentence describes this array?" (This array, show 3 groups of 4. The multiplication sentence is 3 times 4 equals 12.) Ask a student to write the multiplication sentence on the chalkboard.

e.g.,



$$3 \times 4 = 12$$

Repeat this procedure with several other arrays. Vary the procedure by writing a multiplication number sentence on the chalkboard and asking a student to draw the array to represent the multiplication sentence.

4.06.02.01 multiply fractions having values less than 1

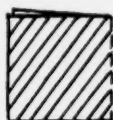
STRATEGY 1: Prepare and distribute rectangular sheets of paper and two different color crayons to each student. Ask the students to fold the paper in half and to use one crayon to shade in one of the halves.

e.g.,



On the chalkboard write $\frac{1}{2}$ of $\frac{1}{2} = \square$. Say, "We have shaded one half. Now we want to find one half of this shaded half. Fold your paper on the fold line again so that only the shaded half is showing."

e.g.,



Say, "Holding your paper this way, fold again so that the shaded part is folded in half."

e.g.,



Say, "You have folded the first half in half. Keeping the paper folded, use your other crayon to shade over the shading on this piece that represents half of one half."

e.g.,



Say, "Now open the paper to show one whole again and look at the part that is shaded with both colors."

e.g.,



Say, "What is the name of the piece that is shaded with both colors? (This piece is one fourth of the whole.) It is also half of the first half we shaded." On the chalkboard write $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{4}$.

4.06.02

STRATEGY 1:

cont'd

Repeat this procedure with several other examples, e.g., $\frac{1}{2}$ of $\frac{1}{3} = \square$ and $\frac{1}{2}$ of $\frac{1}{4} = \square$. When the paper folding has been done and the examples completed, say, "Can you find a shorter way of solving each example? What could have been done to the numerators to get the numerator in the answer? What could have been done to the denominators to get the denominator in the answer? (If we multiplied the numerators in each example, we would get the numerator in the answer. If we multiplied the denominators in each example, we would get the denominator in the answer.) Since multiplication is a way of finding a fractional part of another fractional part, we can replace the word of in the number sentence with a multiplication symbol."

e.g.,

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4} \quad \frac{1}{2} \times \frac{1}{3} = \frac{1}{6} \quad \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$$

Say, "You have discovered how to multiply fractions. What is the short way to multiply fractions?" (We can multiply the numerators and then multiply the denominators.)

Write several examples on the chalkboard and ask the students to solve them in their notebooks.

e.g.,

$$\frac{1}{3} \times \frac{1}{2} = \square \quad \frac{1}{4} \times \frac{1}{3} = \square \quad \frac{1}{3} \times \frac{1}{3} = \square$$

4.06.02.02

rename any whole number as a fraction with a denominator of 1

STRATEGY 1:

Prepare several circles (rectangles, squares). Say, "Usually fractions represent parts of a whole. Today, we will see that whole numbers can also be written as fractions." Display four circles.

e.g.,



4.06.02

STRATEGY 1: cont'd

Say, "Into how many parts has each circle been divided?" (Each circle just has one part.) On the chalkboard write $4 = \frac{\square}{1}$. Say, "The denominator 1 shows that the whole has just 1 part. How many parts are displayed?" (4 of those are displayed.) Write 4 as the numerator in the fraction on the chalkboard.

e.g.,  $= 4 = \frac{4}{1}$

Repeat this procedure with 6 circles and 8 circles. Say, "If a denominator of 8 means cut into 8 equal parts, a denominator of 4 means 4 equal parts, a denominator of 2 means 2 equal parts, what does a denominator of 1 mean? (It means there is only one part, the whole thing.) What do you think $\frac{7}{1}$ means?" (It means 7 wholes with 1 part each, or 7.)

Write several number sentences on the chalkboard for the students to complete in their notebooks.

e.g., $3 = \frac{\square}{\square}$ $16 = \frac{\square}{\square}$ $\frac{4}{1} = \square$ $\frac{12}{1} = \square$

Say, "How can any whole number be written as a fraction?" (Any whole number can be written as a fraction by writing it as the numerator and using a denominator of 1.)

STRATEGY 2:

On the chalkboard write the division expression $\frac{8}{1} = \square$. Say, "How can we find the number that belongs in the box? (We can divide 8 by 1 to find the missing number.) How do you know? ($\frac{8}{1}$ is a way of showing division. It means 8 divided by 1.) What is the missing number?" (8 divided by 1 is 8.) Ask a student to write 8 in the box. Repeat this procedure with other examples, e.g., $\frac{7}{1} = \square$, $\frac{5}{1} = \square$, ...

Say, "What happened when we divided by 1? (The answer was the same as the dividend which, in this

4.06.02

STRATEGY 2:

cont'd

case, is the numerator of the fraction.) Every time the divisor or denominator was 1, the result was a whole number equal to the numerator. The reverse is true, too. Every whole number can be thought of as a fraction where the denominator, or divisor is 1. How can we express 9 as a fraction?" (We can write 9 as the numerator and 1 as the denominator.) Ask a student to write 9 as a fraction on the chalkboard. Repeat this procedure with other numbers.

4.06.02.03

multiply a whole number by a fraction

STRATEGY 1:

Prepare and distribute fractional parts as in Getting Started 1. Say, "Use your eighths to make one whole. Then place $\frac{3}{8}$ in front in you. Next to it, place another $\frac{3}{8}$. How can we write a number sentence to show what we have in front of us? (We can say $\frac{3}{8} + \frac{3}{8} = \frac{6}{8}$.) Another thing that we can say is that 2 groups, with $\frac{3}{8}$ in each group, equals $\frac{6}{8}$. What is another way to say this?" (We could say $2 \times \frac{3}{8} = \frac{6}{8}$.) Write the addition sentence and the multiplication sentence on the chalkboard.

Say, "Now use your fourths to make one whole. Take $\frac{1}{4}$, place another $\frac{1}{4}$ next to it, and another $\frac{1}{4}$ next to that. How can we write a number sentence to show this?" (We can write $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4}$, or $3 \times \frac{1}{4} = \frac{3}{4}$.) Write each number sentence on the chalkboard. Say, "Look at the first multiplication sentence, $2 \times \frac{3}{8} = \frac{6}{8}$. What have we learned about multiplying fractions? (We learned that multiplying fractions can be done by multiplying the numerators and multiplying the denominators.) How is this example different? (One factor is the whole number 2.) What can we do so that 2 may be written as a fraction? (We can write 2 as $\frac{2}{1}$.) Will that change the value of 2?" (No, it is still worth 2.) Write 1 as the denominator and ask

4.06.02

STRATEGY 1: the students to use the rule for multiplying two fractions and to compare their answer with the one previously written on the chalkboard.

cont'd

e.g.,

$$\frac{2}{1} \times \frac{3}{8} = \frac{6}{8}$$

Elicit and write on the chalkboard as the students write in their notebooks:

Multiplication of Fractions

1. Multiply the numerators.
2. Multiply the denominators.

Repeat this procedure with other examples, asking the students to solve them in their notebooks. Say, "How can we multiply a whole number and a fraction?"

(Expressing the whole number as a fraction and then multiply the fractions.) Write the following on the chalkboard as the students write in their notebooks:

Multiplying a Whole Number by a Fraction

1. Express the whole number as a fraction.
2. Multiply the fractions.

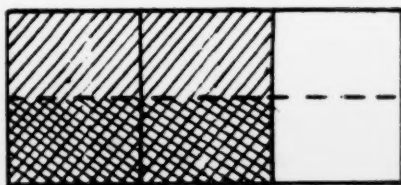
NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

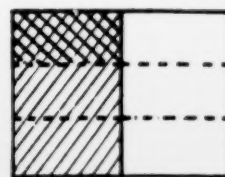
Solve each multiplication sentence below.



$$\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$$



$$\frac{1}{2} \times \frac{2}{3} = \boxed{}$$



$$\frac{1}{3} \times \frac{1}{2} = \boxed{}$$

Complete the number sentences below. Then solve the following riddle: I will awaken at a special moment. Who am I?

S

$$\frac{1}{16}$$

$$\frac{2}{20}$$

$$\frac{3}{20}$$

$$\frac{3}{20}$$

$$\frac{4}{9}$$

$$\frac{2}{12}$$

$$\frac{2}{10}$$

$$\frac{3}{16}$$

$$\frac{3}{12}$$

$$\frac{3}{20}$$

$$\frac{2}{16}$$

$$\frac{2}{15}$$

$$\frac{4}{10}$$

$$\frac{6}{15}$$

$$\frac{1}{8} \times \frac{1}{2} = \boxed{\frac{1}{16}} \text{ S}$$

$$\frac{3}{5} \times \frac{2}{3} = \boxed{} \text{ Y}$$

$$\frac{4}{5} \times \frac{1}{2} = \boxed{} \text{ T}$$

$$\frac{2}{5} \times \frac{1}{3} = \boxed{} \text{ U}$$

$$\frac{1}{2} \times \frac{2}{10} = \boxed{} \text{ L}$$

$$\frac{1}{4} \times \frac{2}{4} = \boxed{} \text{ A}$$

$$\frac{3}{4} \times \frac{1}{5} = \boxed{} \text{ E}$$

$$\frac{2}{3} \times \frac{2}{3} = \boxed{} \text{ P}$$

$$\frac{1}{3} \times \frac{3}{4} = \boxed{} \text{ B}$$

$$\frac{3}{8} \times \frac{1}{2} = \boxed{} \text{ G}$$

$$\frac{1}{2} \times \frac{2}{5} = \boxed{} \text{ N}$$

$$\frac{1}{4} \times \frac{2}{3} = \boxed{} \text{ I}$$

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Write each whole number as a fraction.

$$16 = \frac{16}{1} \quad 23 = \frac{}{} \quad 46 = \frac{}{} \quad 12 = \frac{}{} \quad 8 = \frac{}{}$$

Write each fraction as a whole number.

$$\frac{17}{1} = 17 \quad \frac{15}{1} = \frac{}{} \quad \frac{37}{1} = \frac{}{} \quad \frac{25}{1} = \frac{}{} \quad \frac{56}{1} = \frac{}{}$$

Write each whole number as a fraction. Multiply to find the product.

$$\text{a) } 5 \times \frac{1}{8} = \frac{5}{1} \times \frac{1}{8} = \frac{5}{8} \quad \text{b) } 3 \times \frac{1}{4} = \frac{}{} \times \frac{1}{4} = \frac{}{}$$

$$\text{c) } 6 \times \frac{1}{12} = \frac{}{} \times \frac{1}{12} = \frac{}{} \quad \text{d) } 3 \times \frac{3}{10} = \frac{}{} \times \frac{3}{10} = \frac{}{}$$

$$\text{e) } 2 \times \frac{2}{5} = \frac{}{} \times \frac{2}{5} = \frac{}{} \quad \text{f) } 4 \times \frac{3}{16} = \frac{}{} \times \frac{3}{16} = \frac{}{}$$

CHALLENGE!

Solve the word problems.

1. Joe needs $\frac{3}{8}$ foot of ribbon for each award. How much ribbon does he need for 2 awards? Answer: _____

- 2.a) Jackie used $\frac{1}{4}$ teaspoon of salt for her recipe. How much salt will she use if she triples her recipe?

Answer: _____

- b) How much salt will she have left if she began with one teaspoon of salt? Answer: _____

4.06.03 EQUIVALENT FRACTIONS

(2-3 lesson)

PERFORMANCE OBJECTIVES

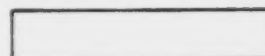
The student will be able to...

4.06.03.01A

recognize equivalent fractions;

e.g.,

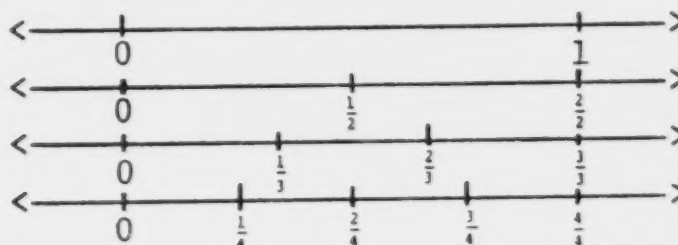
1 unit

shaded part = $\frac{1}{2}$ shaded part = $\frac{6}{12}$ Therefore, $\frac{1}{2} = \frac{6}{12}$

*4.06.03.02A

match a set of equivalent fractions with its corresponding points on the number line;

e.g.,

Therefore, $\frac{2}{2}$ is equivalent to $\frac{3}{3}$. $\frac{1}{2}$ is equivalent to $\frac{2}{4}$. $\frac{2}{2}$ is equivalent to 1 whole. $\frac{3}{3}$ is equivalent to 1 whole.

$$\frac{2}{2} = \frac{3}{3} = \frac{4}{4} = 1$$

4.06.03.03B

use the multiplication identity to generate equivalent fractions.

e.g.,

Write three fractions equivalent to $\frac{1}{4}$.

$$\begin{aligned}\frac{1}{4} &= \frac{1}{4} \times 1 \\ &= \frac{1}{4} \times \frac{2}{2} \\ &= \frac{2}{8}\end{aligned}$$

Therefore, $\frac{1}{4}$ is equivalent to $\frac{2}{8}$

$$\begin{aligned}\frac{1}{4} &= \frac{1}{4} \times 1 \\ &= \frac{1}{4} \times \frac{3}{3} \\ &= \frac{3}{12}\end{aligned}$$

Therefore, $\frac{1}{4}$ is equivalent to $\frac{3}{12}$

$$\begin{aligned}\frac{1}{4} &= \frac{1}{4} \times 1 \\ &= \frac{1}{4} \times \frac{4}{4} \\ &= \frac{4}{16}\end{aligned}$$

Therefore, $\frac{1}{4}$ is equivalent to $\frac{4}{16}$

VOCABULARYTERMS

numerator
denominator
equivalent

GETTING STARTED 1:

Prepare equal sized circles divided into halves, thirds, fourths, and eighths.

e.g.,

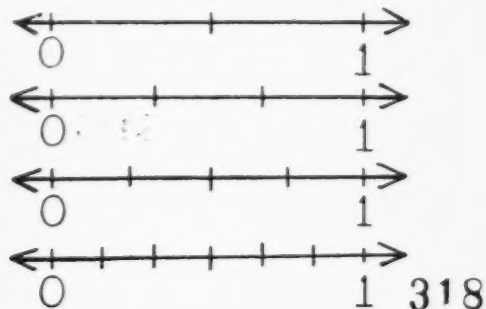


Display the circle divided into thirds and write the fraction $\frac{2}{3}$ on the chalkboard. Ask a student to read the fraction and to shade two thirds of the circle. Say, "How many parts did you shade? (Two parts of the circle were shaded.) How many equal parts are in the whole circle? (There are 3 equal parts in the whole circle.) Which digit is the numerator? (The top digit is the numerator.) What does the numerator tell us? (The numerator tells us the number of shaded parts.) Which digit is the denominator? (The bottom digit is the denominator.) What does the denominator tell us?" (The denominator tells us how many equal parts are in the whole.)

Repeat this procedure asking the students to shade in fractional parts of the circle divided in half, the circle divided into fourths, and the circle divided into eighths and to write the fractions for each in their notebooks.

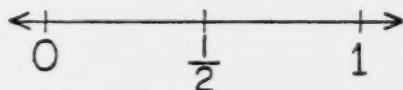
GETTING STARTED 2:

Draw the following number lines on the chalkboard:



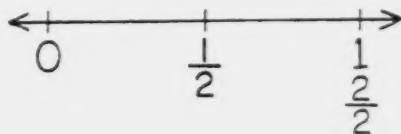
GETTING STARTED 2: cont'd

Say, "How are these number lines the same? (They are all number lines from 0 to 1.) How are they different? (They have each been divided into a different number of equal parts.) Look at the first number line. Into how many equal parts has it been divided? (It has been divided into 2 equal parts.) When something is divided into two equal parts, what name do we give to one of those parts?" (One of the equal parts would be called one half.) Label the point on the number line $\frac{1}{2}$. e.g.,



With your finger, trace along the number line from 0 to $\frac{1}{2}$ and say, "How far have we moved on the number line?" (We have moved as far as one half.) Continue tracing from $\frac{1}{2}$ to 1 and say, "How far have we moved now? (We have moved as far as two halves or 1.) What can we say about the number 1?" (Another name for 1 is two halves.) Write $\frac{2}{2}$ below 1 on the number line.

e.g.,



Repeat this procedure with the other number lines.

4.06.03

4.06.03.01 recognize equivalent fractions

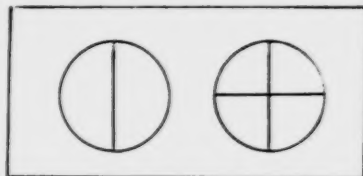
STRATEGY 1: Distribute a sheet of paper to each student. Ask the students to fold the paper into 2 equal parts and to shade one part. Say, "How many equal parts are there? (There are 2 equal parts.) How many parts are shaded? (1 part is shaded.) What fraction names the shaded part? (The shaded part is called $\frac{1}{2}$.) Keeping the paper folded in half, fold the paper in half again. Now how many equal parts are there? (There are 4 equal parts.) What is the name of each part? (Each part is $\frac{1}{4}$.) How many parts are shaded? (2 parts are shaded.) What fraction names the shaded part?" (The shaded part can be called $\frac{2}{4}$ or $\frac{1}{2}$.) Write the fractions $\frac{1}{2}$ and $\frac{2}{4}$ on the chalkboard. Say, "How does shading $\frac{1}{2}$ of the paper compare with shading $\frac{2}{4}$ of the paper. (The amount of shading remains the same.) Since $\frac{1}{2}$ and $\frac{2}{4}$ show the same amount, we say they are equivalent, or equal in value. Just as we can have equivalent values with money, where 5 pennies and 1 nickel are equal in value even though they have different names, we can have equivalent values in fractions." On the chalkboard write an equal symbol between $\frac{1}{2}$ and $\frac{2}{4}$ and ask a student to read the number sentence.

Repeat this procedure by folding another paper into thirds and then sixths, and another paper into fourths and then eighths. Ask the students to name the equivalent fractions and to write them in their notebooks.

STRATEGY 2: Prepare and display a flannel board and felt-backed fractional parts. Place a circle divided into 2 equal parts on the flannel board. Next to it display

4.06.03

STRATEGY 2: a circle which is the same size but is divided into fourths.
cont'd



Point to one half of the first circle and say, "What name can we give this part of the circle?" (We can call it $\frac{1}{2}$.) Ask a student to write $\frac{1}{2}$ on the chalkboard. Say, "Into how many equal parts is the other circle divided? (The other circle is divided into 4 equal parts.) What can we call each part? (We can call each part $\frac{1}{4}$.) How many fourths will fit exactly over $\frac{1}{2}$ of the first circle?" (Two fourths will fit on one half of the first circle.) Ask a student to place two fourths over one half. Say, "Do two fourths fit exactly on one half? (Yes.) Then we can say that $\frac{1}{2}$ and $\frac{2}{4}$ are equivalent fractions. That means they are the same size even though they have different names. We can see by looking at the fractional parts that $\frac{1}{2}$ of the circle is the same size as $\frac{2}{4}$ of the circle." Ask a student to write $\frac{2}{4}$ on the chalkboard next to $\frac{1}{2}$ with an equal symbol between them.

e.g.,

$$\frac{1}{2} = \frac{2}{4}$$

Repeat this procedure to show other equivalent fractions, e.g., $\frac{1}{4} = \frac{2}{8}$, $\frac{1}{3} = \frac{2}{6}$, $\frac{1}{2} = \frac{4}{8}$. As each pair of equivalent fractions is named, ask the students to write them in their notebooks.

4.06.03.02 match a set of equivalent fractions with its corresponding point on the number line

STRATEGY 1: Prepare and display the number lines used in Getting Started 2. Say, "Why did we label the points on these number lines as fractions? (We labeled them as

4.06.03

STRATEGY 1: cont'd

fractions because they are equal parts of 1 whole space on the number line.) Look at the number line divided into two equal parts. How is the first mark labeled? (The first mark is labeled 0.) ...last mark labeled? (The last mark is labeled 1.) How is the mark labeled that separates the one space into two equal parts? (The mark is labeled one half.) What is another name for 1 on this number line?" (Another name for 1 is $\frac{2}{2}$.) Repeat this procedure using the other number lines.

Ask a student to place his/her finger at $\frac{1}{2}$ on the first number line. Say, "Look at the other number lines. Find a mark in the same place on the other number lines. What marks did you find?" (We found $\frac{2}{4}$ and $\frac{3}{6}$.) Ask the student to use his/her finger to trace down from $\frac{1}{2}$ to $\frac{2}{4}$ to $\frac{3}{6}$. Say, "These three fractions all name the point halfway between 0 and 1. They have different names but represent the same amount on the number line." On the chalkboard write $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$ and ask the students to write them in their notebooks.

Say, "How did we show that $\frac{1}{2}$, $\frac{2}{4}$, and $\frac{3}{6}$ are all equivalent fractions?" (We found that $\frac{1}{2}$, $\frac{2}{4}$, and $\frac{3}{6}$ all name the same point on the number line. Therefore, they are equivalent.)

Repeat this procedure with other pairs or groups of equivalent fractions on the number lines.

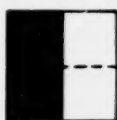
4.06.03.03 use the multiplication identity to generate equivalent fractions

STRATEGY 1: Draw a square on the chalkboard. Draw a vertical line to divide it into 2 equal parts. Shade one part. Say, "How many parts are there in all? (There

4.06.03

STRATEGY 1: are 2 parts.) How many parts are shaded?" (1 part is shaded.) Draw a horizontal line through the middle of the square.

e.g.,



Say, "How many equal parts are there now? (There are 4 equal parts) How many are shaded? (Two parts are shaded.) What is the name of the shaded part now? (The shaded part is $\frac{2}{4}$.) Have we changed the amount of shading? (No.) What conclusion can we draw?" Elicit and write on the chalkboard $\frac{1}{2} = \frac{2}{4}$. Ask the students to read the number sentence and to write it in their notebooks along with the diagram.

Say, "What was done to the parts when I drew the horizontal line? (When you drew the horizontal line, you made 2 times as many shaded parts and 2 times as many parts in all.) We can say that the numerator and denominator were multiplied by 2. Whenever the numerator and denominator are multiplied by the same number, the new fraction will be equivalent to the first fraction."

e.g.,

$$\frac{1}{2} \xrightarrow{x2=} \frac{2}{4} \quad \text{Therefore, } \frac{1}{2} = \frac{1}{2} \times \frac{2}{2} = \frac{2}{4}.$$

Say, "What is meant by fractions being equivalent?" (Equivalent fractions are the same size even though they have different names.) Write $\frac{1}{2}$ on the chalkboard again. Say, "What fraction equivalent to $\frac{1}{2}$ will we get if we multiply the numerator and denominator by 3?" Ask a student to multiply at the chalkboard as the other students work in their notebooks.

4.06.03

STRATEGY 1:
cont'd

e.g.,

$$\frac{1}{2} \xrightarrow{x3=} \frac{3}{6} \quad \text{Therefore, } \frac{1}{2} = \frac{1}{2} \times \frac{3}{3} = \frac{3}{6}.$$

Say, "What do fractions such as $\frac{2}{2}$, $\frac{3}{3}$ and $\frac{4}{4}$ have in common? (Their numerators and denominators are the same.) Fractions whose numerators and denominators are the same are all other names for the whole number 1. What happens when we multiply a factor by 1? (The product is always that factor.) When we multiply a fraction by another fraction that is a name for 1, our answer is the same fraction but with a different name." Write the following on the chalkboard as the students write in their notebooks:

To change fractions into equivalent fractions, multiply the fraction by a fractional name for one.

Say, "How can you name other fractions equivalent to $\frac{1}{2}$?" (We could multiply the numerator and denominator by 4, 5, 6, ...)

Repeat this procedure to generate equivalent fractions for other fractions, e.g., $\frac{1}{3}$, $\frac{2}{3}$, $\frac{3}{4}$, ...

STRATEGY 2: Write the following on the chalkboard:

$$6 \times 1 = \square \quad 12 \times 1 = \square \quad 150 \times 1 = \square \quad 329 \times 1 = \square$$

Say, "What is the same about each multiplication fact? (One of the factors in each example is 1.) What do you know about the product in each example?" (The product will be equal to the other factor.) Ask a student to complete each example at the chalkboard. Write the following on the chalkboard:

$$\frac{1}{2} \times 1 = \square \quad \frac{6}{9} \times 1 = \square \quad \frac{3}{5} \times 1 = \square$$

STRATEGY 2:
cont'd

Say, "When we multiply a fraction by 1, the product will still be equal to the other factor." Ask a student to complete the examples at the chalkboard as the other students solve them in their notebooks. When they have been completed say, "In multiplication, when one of the factors is 1, the product always equals the other factor. This is true even if we use another name for 1 instead of the numeral 1 itself. What are some fractional names for 1?" (Some fractional names for 1 are, $\frac{1}{1}$, $\frac{2}{2}$, $\frac{3}{3}$, ...)

Write the following on the chalkboard:

$$\frac{1}{2} \times \frac{2}{2} = \square \quad \frac{1}{2} \times \frac{3}{3} = \square \quad \frac{1}{2} \times \frac{4}{4} = \square$$

Say, "Look at the second factor in each example. What do you notice? (In each example the second factor is another name for 1.) Since we are multiplying by 1, even though we are using another name for 1, the product will be equal in value, or equivalent, to the first fraction." Ask a student to complete the first example. Say, "How much is $\frac{1}{2}$ times $\frac{2}{2}$? ($\frac{1}{2}$ times $\frac{2}{2}$ equals $\frac{2}{4}$.) Because we really multiplied by 1, the product, $\frac{2}{4}$, is equivalent to $\frac{1}{2}$." On the chalkboard write $\frac{1}{2} = \frac{2}{4}$. Repeat this procedure with the other examples. Ask a student to perform the multiplication at the chalkboard as the other students work in their notebooks.

e.g.,

$$\frac{1}{2} \times 1 = \frac{1}{2}$$

$$\frac{1}{2} \times 1 = \frac{1}{2}$$

$$\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$$

$$\frac{1}{2} \times \frac{4}{4} = \frac{4}{8}$$

$$\frac{1}{2} = \frac{3}{6}$$

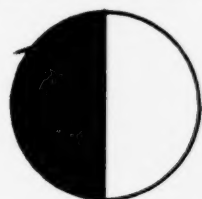
$$\frac{1}{2} = \frac{4}{8}$$

Repeat this procedure with other fractions multiplied by various names for 1.

NAME: _____ CLASS: _____ DATE: _____

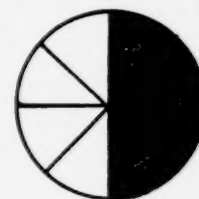
Follow the directions below.

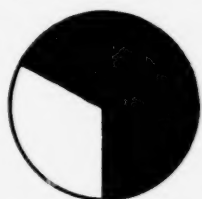
1. Name each shaded fraction. Then cut along the dotted lines.
2. Use the cards to play Match Game. Choose a partner for this game.
3. Place the cards face down.
4. Pick two cards. If they are equivalent fractions, you may keep the cards and try again.
5. If they are not equivalent fractions return the cards and the other player may take a turn.
6. The player with the most cards at the end of the game is the winner.



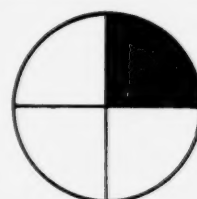
$$\frac{1}{2}$$

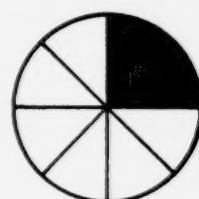

$$\frac{2}{2}$$

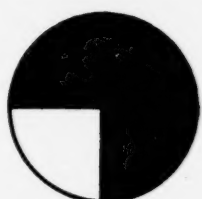

$$\frac{3}{4}$$


$$\frac{4}{8}$$


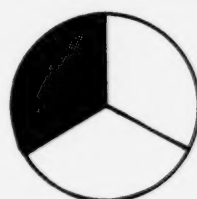
$$\frac{2}{2}$$

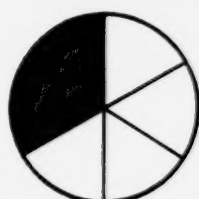

$$\frac{3}{4}$$


$$\frac{1}{4}$$


$$\frac{2}{8}$$


$$\frac{3}{4}$$

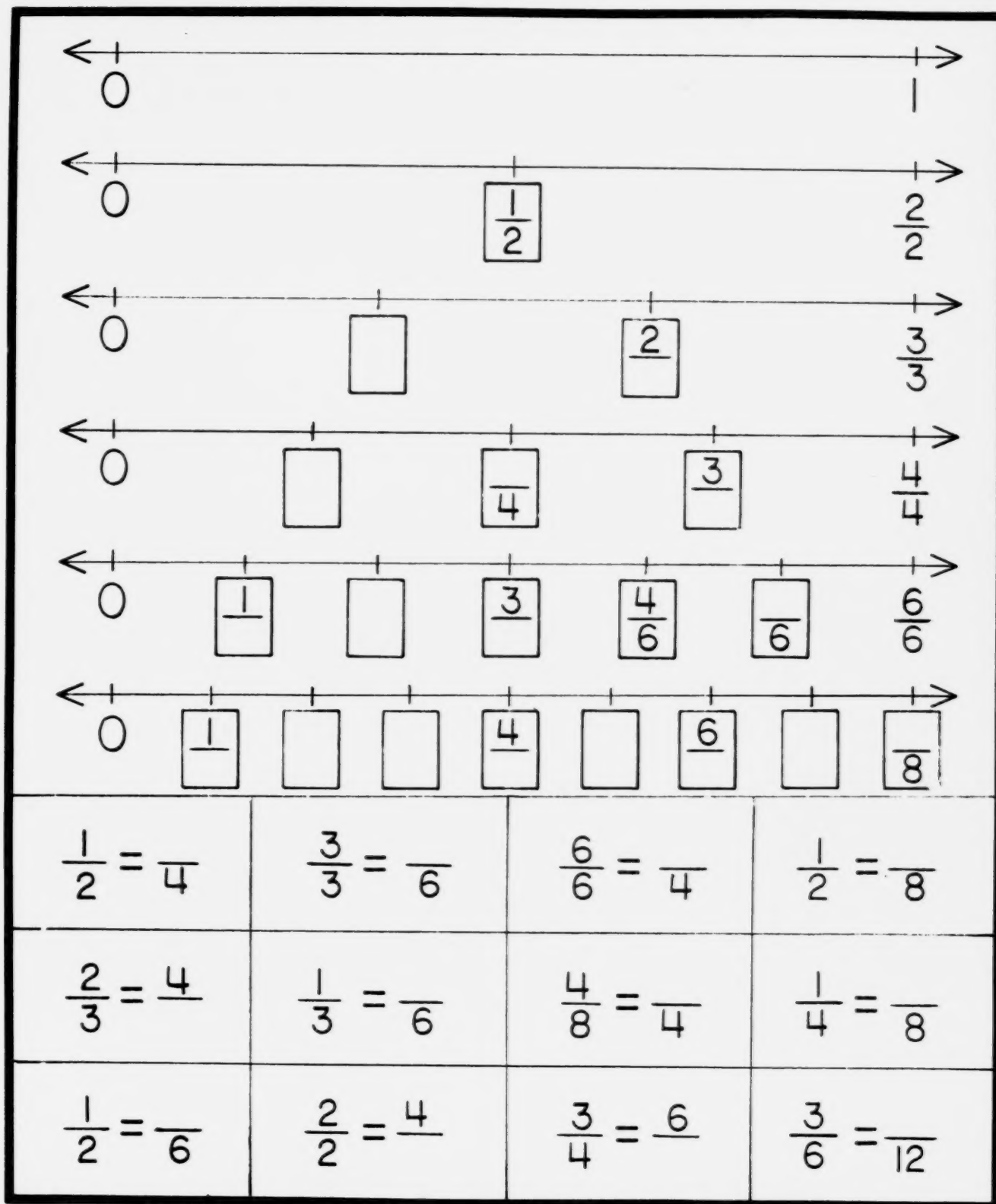

$$\frac{3}{4}$$


$$\frac{2}{3}$$


$$\frac{3}{6}$$

NAME: _____ CLASS: _____ DATE: _____

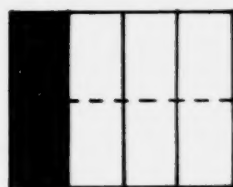
Fill in the missing points on each number line. Use the number lines to find the equivalent fractions.



NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

- A. Draw a horizontal line to make an equivalent fraction.
Name the equivalent fraction.



$$\frac{1}{4} = \frac{2}{8}$$



$$\frac{2}{3} = \boxed{}$$



$$\frac{2}{4} = \boxed{}$$



$$\frac{3}{7} = \boxed{}$$

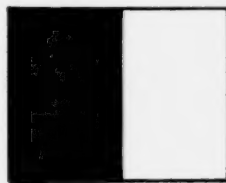
- B. Draw two horizontal lines to make equivalent fractions.
Name the equivalent fractions.



$$\frac{1}{4} = \frac{3}{12}$$



$$\frac{2}{6} = \boxed{}$$



$$\frac{1}{2} = \boxed{}$$



$$\frac{2}{3} = \boxed{}$$

- C. Name the equivalent fraction.

$$\frac{1}{2} = \frac{2}{\boxed{}}$$

$$\frac{2}{3} = \frac{\boxed{}}{6}$$

$$\frac{1}{5} = \frac{3}{\boxed{}}$$

$$\frac{3}{4} = \frac{9}{\boxed{}}$$

- D. Name one equivalent fraction for each fraction below.

$$\frac{1}{3} = \boxed{}$$

$$\frac{2}{5} = \boxed{}$$

$$\frac{1}{8} = \boxed{}$$

$$\frac{5}{6} = \boxed{}$$

CHALLENGE!

Look at each fraction in the code boxes. Find an equivalent fraction in the boxes below and write the code letter in the box.

WHAT HAS A BARK
BUT NEVER BITES?



E	T	A	R
$\frac{1}{2}$	$\frac{2}{3}$	$\frac{2}{5}$	$\frac{3}{4}$

$\frac{4}{10}$

$\frac{4}{6}$	$\frac{6}{8}$	$\frac{5}{10}$	$\frac{3}{6}$

SHARPENING YOUR SKILLS

Units 24, 25, 26

Name: _____ Class: _____ Date: _____

1. Find the average of the following numbers:

26, 22, 30, 18

The average is _____.

Use the following table to answer questions 2 and 3.

Weekly	Temperature
Sunday	80°
Monday	82°
Tuesday	69°
Wednesday	87°
Thursday	72°
Friday	82°
Saturday	82°

2. What was the range in temperature for the past week?

(a) 80° (c) 18°
(b) 82° (d) 22°

3. Find the mode for the weekly temperature.

(e) 18° (g) 87°
(f) 69° (h) 82°

4. Sal was reading an adventure story. He read 18 pages on Monday, 16 pages on Tuesday, 24 pages on Wednesday, 12 pages on Thursday, and 20 pages on Friday. What was the average number of pages Sal read each day?

(a) 90 pages (c) 18 pages
(b) 20 pages (d) Not Here

5. $\frac{2}{5} \times \frac{1}{2} = \square$

(e) $\frac{2}{5}$ (g) $\frac{2}{10}$
(f) $\frac{3}{7}$ (h) Not Here

6. $\frac{1}{2} \times \frac{3}{4} = \square$

7. $3 \times \frac{1}{5} = \square$

8. $\frac{1}{4} \times 3 = \square$

9. $\frac{1}{2} = \frac{\square}{4}$

(a) 1 (c) 3
(b) 2 (d) Not Here

10. $\frac{3}{4} = \frac{\square}{8}$

(e) 3 (g) 5
(f) 6 (h) Not Here

11. $\frac{2}{5} = \frac{6}{\square}$

12. Name 2 fractions that are equivalent to $\frac{1}{3}$.

$\frac{1}{3} = \square$ $\frac{1}{3} = \square$

4.06.04 ORDER OF UNIT FRACTIONS

(1 lesson)

PERFORMANCE OBJECTIVES

The student will be able to...

4.06.04.01A

order numerically 3 unit fractions from least to greatest or greatest to least; e.g.,



$$\frac{1}{5} < \frac{1}{3} < \frac{1}{2}$$



$$\frac{1}{2} > \frac{1}{3} > \frac{1}{5}$$

*4.06.04.02A

solve word problems related to skills learned in this module.

e.g.,

The teacher gave Arthur, Chris, and Sonia the same amount of homework. Arthur did $\frac{1}{3}$ of his homework before supper. Chris did $\frac{1}{2}$ of his homework before supper. Sonia did $\frac{1}{5}$ of her homework before supper. Who did the greatest amount of homework before supper?... the least amount?

VOCABULARYTERMS

numerator
denominator

GETTING STARTED 1:

On the chalkboard write the fraction $\frac{3}{4}$. Ask the students to identify the fraction. Say, "Which digit is the numerator? (3 is the numerator.) Which digit is the denominator? (4 is the denominator.) What do the denominator and the numerator tell us?" (The denominator tells us into how many equal parts the whole has been divided. The numerator tells us how many of those parts we are talking about.) Ask several students to draw a picture on the chalkboard to show $\frac{3}{4}$.

e.g.,



Repeat this procedure for other fractions.

GETTING STARTED 2:

On the chalkboard draw a pair of equal circles divided into 6 equal parts. Shade two parts of circle A and three parts of circle B.

e.g.,



Say, "What part of circle A is shaded?" ($\frac{2}{6}$ of circle A is shaded.) Ask a student to write $\frac{2}{6}$ on the chalkboard. Repeat this procedure for circle B. Say, "Which fraction is larger $\frac{2}{6}$ or $\frac{3}{6}$? ($\frac{3}{6}$ is larger than $\frac{2}{6}$.) How can you tell that $\frac{3}{6}$ is larger?" (Both circles are equal in size and are divided into six equal parts, or sixths. Three sixths is more than two sixths because, when all the parts are equal in size, three parts are more than two parts.)

Repeat this procedure comparing other like fractions.

e.g., $\frac{1}{3}$ and $\frac{2}{3}$, $\frac{1}{4}$ and $\frac{3}{4}$, $\frac{5}{8}$ and $\frac{2}{8}$.

4.06.04

4.06.04.01 order numerically 3 unit fractions from least to greatest or greatest to least

STRATEGY 1: Prepare and distribute a set of colored rods to each student or group of students. Say, "Place a dark green rod on your desk. Let's think of this dark green rod as 1 whole. How many red rods equal a green rod? (3 red rods equal a green rod.) What fractional name can we give to one red rod?" (One red rod can be called $\frac{1}{3}$.) On the chalkboard write one red rod = $\frac{1}{3}$. Say, "How many light green rods equal the dark green rod? (2 light green rods equal the dark green rod.) What name can we give to one light green rod?" (One light green rod can be called $\frac{1}{2}$.) On the chalkboard write one light green rod = $\frac{1}{2}$. Say, "How many white rods equal the dark green rod? (6 white rods equal the dark green rod.) What name can we give to one white rod?" (One white rod can be called $\frac{1}{6}$.) On the chalkboard write one white rod = $\frac{1}{6}$. Say, "Keep one red rod, one light green rod, and one white rod on your desk and put the other rods aside. How can we compare each rod to the dark green rod? (The red rod is $\frac{1}{3}$ of the dark green rod, the light green rod is $\frac{1}{2}$ of the dark green rod, and the white rod is $\frac{1}{6}$ of the dark green rod.) Place the rods in size order from least to greatest on your desk. Which rod is the smallest? (The white rod is the smallest.) Which rod is the largest?" (The light green rod is the largest.) Ask a student to write on the chalkboard the fractional name of each rod in order from least to greatest.

e.g., $\frac{1}{6}$ $\frac{1}{3}$ $\frac{1}{2}$

Say, " $\frac{1}{6}$ is less than $\frac{1}{3}$ and $\frac{1}{3}$ is less than $\frac{1}{2}$." Ask a student to write the less than symbol (<) between each pair of fractions.

4.06.04

STRATEGY 1: e.g.,

cont'd $\frac{1}{6} < \frac{1}{3} < \frac{1}{2}$

Ask the students to order the rods from greatest to least and to write the fractions in their notebooks in order from greatest to least. Say, "What happens to the size of each fractional part as the denominator gets larger? (As the denominator gets larger, the pieces get smaller.) Why does that happen?" (To get a greater number of pieces from a whole, you must cut smaller pieces.) Repeat this procedure several times using other rods.

On the chalkboard write $\frac{1}{5}$, $\frac{1}{4}$, $\frac{1}{8}$. Say, "Without using your rods, can you tell which fraction is the least? ... the greatest? ($\frac{1}{8}$ is the least fraction and $\frac{1}{4}$ is the greatest fraction.) How do you know?" (When the numerators are the same, the fraction with the smallest denominator is the greatest fraction and the fraction with the greatest denominator is the least fraction.) Ask a student to write the fractions in increasing order on the chalkboard. Ask another student to write them in decreasing order. Ask the other students to write them in their notebooks.

Repeat this procedure using other groups of fractions.

STRATEGY 2: Prepare and display three circles of equal size, one divided into halves, one into thirds, and one into fourths. Shade one part of each.

e.g.,



Say, "Look at each shaded fractional part." Ask a student to write the fraction for each shaded part on the chalkboard. Say, "Which shaded part is largest? ($\frac{1}{2}$ is largest.) Which shaded part is smallest?" ($\frac{1}{4}$ is smallest.) Ask a student to write the three

4.06.04

STRATEGY 2:
cont'd

fractions on the chalkboard in size order from least to greatest. Ask the other students to write them in their notebooks.

e.g.,

$$\frac{1}{4} \quad \frac{1}{3} \quad \frac{1}{2}$$

Say, " $\frac{1}{4}$ is less than $\frac{1}{3}$." Ask a student to place the less than symbol (<) between $\frac{1}{4}$ and $\frac{1}{3}$. Say, " $\frac{1}{3}$ is less than $\frac{1}{2}$." Ask a student to place the less than symbol between $\frac{1}{3}$ and $\frac{1}{2}$. Ask the other students to do the same in their notebooks.

e.g.,

$$\frac{1}{4} < \frac{1}{3} < \frac{1}{2}$$

Say, "What do you notice about the numerator of these fractions? (The numerator of each fraction is the same, 1.) What do you notice about the denominator?" (The smallest fraction has the largest denominator and the largest fraction has the smallest denominator.)

Say, "Look again at the shaded parts of the three circles. How can we arrange them from greatest to least?" (From greatest to least they are $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$.) Ask a student to write these fractions on the chalkboard, using the greater than symbol (>). Ask the other students to do the same in their notebooks.

e.g.,

$$\frac{1}{2} > \frac{1}{3} > \frac{1}{4}$$

Say, "If the numerators are the same, how do we compare fractions with different denominators? (As the denominator gets larger, the fraction gets smaller. As the denominator gets smaller, the fraction gets larger.) Why do you think this is so?" (The more parts into which a whole is divided, the smaller each part must be.)

Repeat this procedure using other fractions.

4.06.04

4.06.04.02 solve word problems related to skills learned in this module

STRATEGY 1: Prepare fractional parts of the same size circle and several word problems. Write one problem on the chalkboard and ask a student to read it aloud.

e.g.,

Dennis, Tony, and Fran ordered a pizza.

Dennis ate $\frac{1}{4}$ of the pizza, Tony ate $\frac{1}{2}$, and Fran ate $\frac{1}{8}$. Who ate the most pizza? Who ate the least?

Say, "What do we have to find? (We must find who ate the most pizza and who ate the least pizza.) We will use our fractional parts to help us solve this problem." Ask a student to choose the appropriate fractional parts to compare and display on the chalkboard in order from greatest to least.

e.g., Tony Dennis Fran



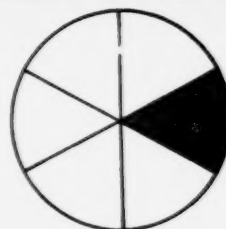
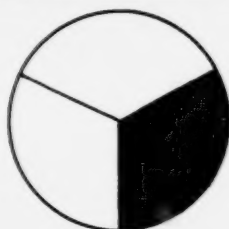
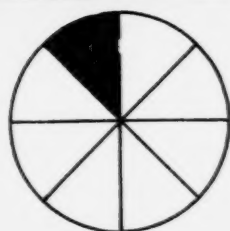
Say, "Who ate the most pizza? (Tony ate the most pizza.) Who ate the least amount of pizza?" (Fran ate the least amount of pizza.)

Say, "How do we order fractions with the same numerator and different denominators?" (As the denominators get larger, the size of each fractional part gets smaller. As the denominator gets smaller, the size of each fractional part gets larger.)

Repeat this procedure using other word problems.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.



1. Look at the three circles. Write the shaded fractions from least to greatest.

_____ < _____ < _____

2. $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{3}$

Which of these fractions is neither greatest nor least?

3. $\frac{1}{6}$ $\frac{1}{5}$ $\frac{1}{8}$

Arrange these fractions from greatest to least. Fill in > or <.

_____ ○ _____ ○ _____

4. Billy had $\frac{1}{4}$ of a dollar, Susie had $\frac{1}{10}$ of a dollar, and Maria had $\frac{1}{2}$ of a dollar. List the fractions in order from greatest to least.

_____ > _____ > _____

Who had the most money?

_____ had the most money.

5. If Eddie worked $\frac{1}{5}$ of an hour on Monday, $\frac{1}{3}$ of an hour on Tuesday, and $\frac{1}{4}$ of an hour on Wednesday, on which day did he work the greatest amount of time?

On which day did he work the least amount of time?

6. Look at each group of fractions. Write > or < in each circle to make each statement true.

$$\frac{1}{2} \bigcirc \frac{1}{4} \bigcirc \frac{1}{6}$$

$$\frac{1}{5} \bigcirc \frac{1}{3} \bigcirc \frac{1}{2}$$

$$\frac{1}{6} \bigcirc \frac{1}{7} \bigcirc \frac{1}{8}$$

$$\frac{1}{6} \bigcirc \frac{1}{10} \bigcirc \frac{1}{20}$$

$$\frac{1}{8} \bigcirc \frac{1}{4} \bigcirc \frac{1}{3}$$

$$\frac{1}{23} \bigcirc \frac{1}{22} \bigcirc \frac{1}{21}$$

4.10.02 LINEAR MEASUREMENT

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*4.10.02.01A

identify $\frac{1}{8}$ inch on the ruler;

e.g.,



*4.10.02.02A

identify a mile as a customary measure of distance;

e.g.,

Stanley walked two miles to the train station.

4.10.02.03A

identify the equivalent relationships among inch, foot, yard and mile;

e.g.,

12 inches = 1 foot

3 feet = 1 yard

5,280 feet = 1 mile

1,760 yards = 1 mile

*4.10.02.04A

identify a kilometer as a metric measure of distance.

e.g.,

David drove 80 kilometers in an hour.

VOCABULARY**TERMS**

inch
foot
yard
mile
kilometer

GETTING STARTED 1:

Prepare and display a 12 inch ruler and a yardstick. On the chalkboard write inch, foot, and yard. Ask several students to identify the measurement tools displayed and to find something in the room that measures about one inch, something that measures about one foot, and something that measures about one yard. Say, "What are some items you would measure in inches? ...feet? ...yards?" (Accept all reasonable responses.) List the responses on the chalkboard.

e.g.,

<u>items measured in inches</u>	<u>items measured in feet</u>	<u>items measured in yards</u>
pencil	person's height	football field
waist	length of a room	hallway

GETTING STARTED 2:

Prepare and distribute a box of paper clips and a ruler or yardstick to each group of students. Say, "You will make and measure a paper clip chain. Everytime you add a clip, you will measure and record the length of your chain to the nearest $\frac{1}{4}$ inch."

e.g.,

<u>number of clips</u>	<u>length of chain</u>
1	$1\frac{1}{2}"$
2	3"
:	:
:	:

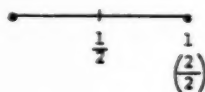
Repeat this procedure by varying the length of clips distributed and asking the students to measure to the nearest $\frac{1}{4}$ inch.

4.10.02

4.10.02.01 identify $\frac{1}{8}$ inch on the ruler

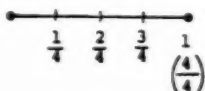
STRATEGY 1: Prepare and distribute a piece of unlined paper and a ruler marked in eighths to each student. Say, "How many inches are on your ruler? (The answer will depend on the kind of rulers distributed.) Each of these inches has also been divided to show parts of an inch. Point to the half inch mark on your ruler. Draw an inch line on your paper. Make a mark at the $\frac{1}{2}$ inch and label it. How many half inches are there in 1 inch? (There are 2 half inches in 1 inch.) Write $\frac{2}{2}$ under the one inch mark."

e.g.,



Say, "Find the $\frac{1}{4}$ inch marks on your ruler. Into how many parts do these marks divide an inch? (They divide an inch into 4 equal parts.) Use your ruler to draw another inch line and label each $\frac{1}{4}$ inch on it. How many $\frac{1}{4}$ inches are there in 1 inch? (There are four $\frac{1}{4}$ inches in 1 inch.) Write $\frac{4}{4}$ under the one inch mark."

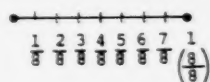
e.g.,



Say, "Look at your first inch line. How many $\frac{1}{4}$ inches are there in $\frac{1}{2}$ inch? (There are $\frac{2}{4}$ inches in $\frac{1}{2}$ inch.) Can you say that another way? (Yes. $\frac{1}{2}$ inch is equivalent to $\frac{2}{4}$ inches.) Now look at the lines that separate the inch into 8 parts. What do you think we call each line? (Each line is $\frac{1}{8}$ inch.) Find the $\frac{1}{8}$ inch marks on your ruler. Into how many parts do these marks divide an inch? (They divide an inch into 8 equal parts.) Use your ruler to draw another inch line and label each $\frac{1}{8}$ inch. How many $\frac{1}{8}$ inches

4.10.02

STRATEGY 1: are there in 1 inch? (There are eight $\frac{1}{8}$ inches in 1 inch.) Write $\frac{8}{8}$ under the one inch mark."
cont'd
e.g.,



Say, "Look at your first two inch lines. How many $\frac{1}{8}$ inches are there in $\frac{1}{4}$ inch? ... $\frac{1}{2}$ inch? (There are $\frac{2}{8}$ inches in $\frac{1}{4}$ inch... $\frac{4}{8}$ inches in $\frac{1}{2}$ inch.) Can you find more equivalent fractions among your three inch marks?" (Accept all correct answers.) Ask the students to measure some classroom items to the nearest $\frac{1}{8}$ inch and to write the item and its measurement in their notebooks.

4.10.02.02 identify a mile as a customary measure of distance

STRATEGY 1: Prepare and display a local or city map. Ask the students to locate on the map a familiar place or places they have visited. Say, "Could we walk there? How long do you think it would take to walk there? How long do you think it would take to drive there?" Introduce the term 'mile' to the class and say, "Miles are used to measure long distances. A mile is approximately 20 city blocks. One mile equals 5,280 feet." Write the list of familiar places on the chalkboard and use the map legend to find the approximate distance in miles from the school to each place.
e.g.,

<u>Place</u>	<u>Distance from school</u>
Coney Island	9 miles
Staten Island Zoo	18 miles
Kennedy Airport	7 miles
IRT Subway	1 mile

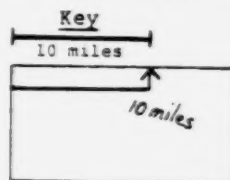
Compare units used to measure length or distance.
Say, "Which unit would you use to measure the length

4.10.02

STRATEGY 1: of the chalkboard? (We would use inches, feet, or yards.) Which unit of measure would you use to measure the distance from our school to the Empire State Building?" (We would measure the distance in miles.)

STRATEGY 2: Prepare and display a map of New York State. Say, "The mile is one kind of unit that is used to measure long distances. A mile is approximately 20 blocks. If we think of a mile in terms of feet, it equals 5,280 feet. Look at the map legend. This is a key that shows how many miles a certain measurement represents on that map. We will use this key to get an approximate measurement for our imaginary travels from one city to another city in New York State. Write the name of the city where you will begin and the city to which you will travel." On an index card or piece of paper, mark off the mile/miles designation from the map's key.

e.g.,



Ask the students to come to the map and use the mile designation on the index card to measure the distance from one city to another and explain their method of arriving at the measure of the distance.

4.10.02.03 identify the equivalent relationships among inch, foot, yard, and mile

STRATEGY 1: Prepare and display several 12 inch rulers and a yardstick. Ask the students to identify each measuring instrument. Hold up the 12 inch ruler and say, "How many inches equal 1 foot?" (12 inches equal 1 foot.) Ask a student to count the number of inches on the ruler as a check. On the chalkboard write 12

4.10.02

STRATEGY 1: cont'd

inches = 1 foot. Say, "How many inches are in one yard?" (There are 36 inches in one yard.) Ask a student to verify the answer by using the yardstick. On the chalkboard write $36 \text{ inches} = 1 \text{ yard}$. Say, "How many feet are in a yard?" (There are 3 feet in 1 yard.) Ask a student to check by placing three 12 inch rulers along the yardstick. On the chalkboard write $3 \text{ feet} = 1 \text{ yard}$.

Say, "A mile is a long distance. Do you think it will take more yards or more feet to equal a mile? (It will take more feet than yards to equal a mile.) Why?" (Feet are smaller units of measure than yards so it will take more of them to equal a mile.) Write the following on the chalkboard:

$5,280 \text{ feet} = 1 \text{ mile}$

$1,760 \text{ yards} = 1 \text{ mile}$

Ask the students to read the equivalents on the chalkboard and to write them in their notebooks.

4.10.02.04 identify a kilometer as a metric measure of distance

STRATEGY 1:

Prepare several meter sticks and chalk. Say, "In most countries the kilometer is used rather than the mile to measure long distances." Escort the class to the schoolyard. Using a meter stick and chalk, mark off 1 meter. Repeat this 10 times. Say, "The kilometer is a measurement of distance which is equal to 1,000 meters. We have marked a distance of 10 meters. A kilometer, or 1,000 meters, is 100 times as long as the length we measured."

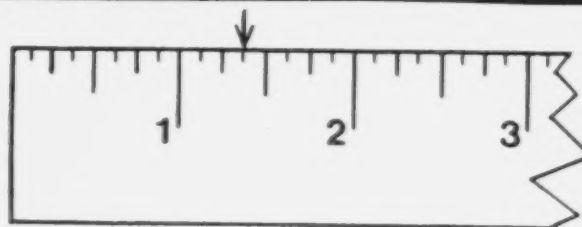
When the students return to the classroom, write on the chalkboard $1 \text{ kilometer} = 1,000 \text{ meters}$.

NAME: _____ CLASS: _____ DATE: _____

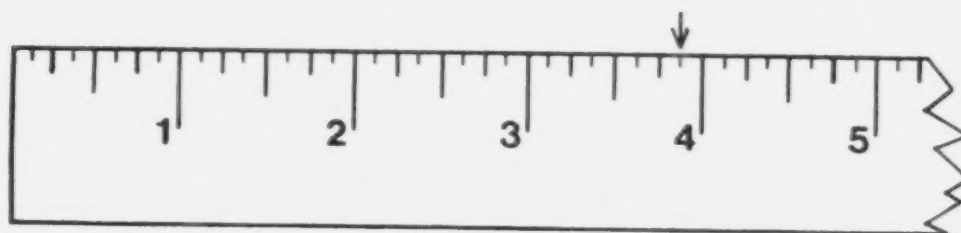
Write the measurement to which the arrows are pointing.



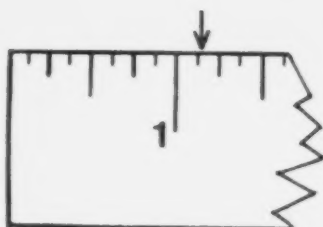
_____ inch



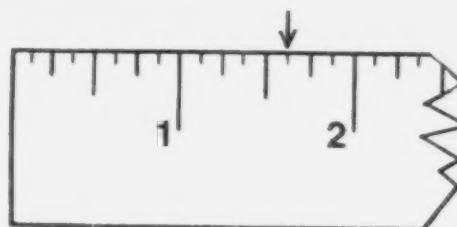
_____ inches



_____ inches



_____ inches



_____ inches

CHALLENGE!How many $\frac{1}{8}$ inches are there in 3 inches? _____How many $\frac{1}{4}$ inches are there in 3 inches? _____How many $\frac{1}{2}$ inches are there in 3 inches? _____

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

A. Complete the chart.

_____ inches = 1 foot

_____ inches = 1 yard

_____ feet = 1 yard

_____ feet = 1 mile

_____ yards = 1 mile

B. Write inches, feet, yards, miles, or kilometer to complete each sentence.

1. Jackie ran a marathon. She ran 26 _____.

2. Sue is 48 _____ tall.

3. The door to our classroom is about 6 _____ high.

4. Teddy has a swimming pool in his backyard.
The water is 4 _____ deep.

5. One thousand meters equals one _____.

6. A football field measures 100 _____.

Do you remember?

$$\begin{array}{r} 20 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 60 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 40 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 300 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 500 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 700 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} 800 \\ \times 4 \\ \hline \end{array}$$

SHARPENING YOUR SKILLS

Units 27, 28

Name: _____

Class: _____

Date: _____

1. Which number sentence correctly describes the shaded parts of these figures?

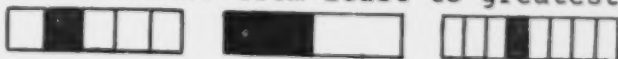


- (a) $\frac{1}{5} > \frac{1}{4} > \frac{1}{3}$ (c) $\frac{1}{5} < \frac{1}{4} < \frac{1}{3}$
 (b) $\frac{1}{5} > \frac{1}{4} < \frac{1}{3}$ (d) Not Here

2. Billy walked $\frac{1}{4}$ of a kilometer after breakfast, $\frac{1}{2}$ of a kilometer after lunch, and $\frac{1}{3}$ of a kilometer after dinner. When did Billy do the most walking?

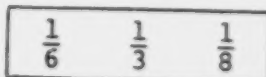
- (e) after lunch
 (f) after dinner
 (g) after breakfast
 (h) at midnight

3. Write the fractions for the shaded parts of these figures in order from least to greatest.



_____ < _____ < _____

4. Write these 3 fractions in order from greatest to least.



_____ > _____ > _____

5. Pat must walk a very long way to get to her grandmother's house. Which of these distances might tell how far away her grandmother lives?

- (a) a mile (c) a meter
 (b) a yard (d) a foot

6. Nora measured her room. It was 4 yards long. How many feet long is her room?

Her room is _____ feet long.

- 7.



Which of these units of measure would be best for measuring the distance from New York to Los Angeles?

- (e) inches (g) yards
 (f) meters (h) kilometers

8. Here are 3 distances:

$\frac{1}{5}$ of a mile, $\frac{1}{3}$ of a mile,
 $\frac{1}{10}$ of a mile

Which distance is greatest? _____

Which distance is least? _____

4.01.04 EVEN AND ODD PATTERNS WITH ADDITION
AND SUBTRACTION

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*4.01.04.01A

define an even number as a number which is divisible by 2 or when divided by 2 leaves no remainder;

e.g.,

12 is an even number because $12 \div 2 = 6$
 (no remainder).

*4.01.04.02A

define an odd number as a number which, when divided by 2, has a remainder of 1;

e.g.,

3 is an odd number because $3 \div 2 = 1 \text{ R}1$

*4.01.04.03A

use an addition chart to determine even and odd sums;

e.g.,

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

What kind of number is the sum of two even numbers? ... two odd numbers? ... an odd number and an even number?

4.01.04.04A

determine if differences of even and odd numbers are even or odd.

e.g.,

What kind of number is the difference of two even numbers? ... two odd numbers? ... an odd and an even number?

347

VOCABULARY**TERMS**

even
odd
pattern

GETTING STARTED 1:

Prepare and distribute a set of 30 interlocking cubes to each group of students. Say, "Place your cubes into 4 groups, one with 6 cubes, one with 7 cubes, one with 8 cubes and one with 9 cubes. Can you stack each group in two equal piles? (The group of 6 can be made into two piles of 3 each and the group of 8 can be made into two groups of 4 each. 7 blocks cannot be placed into two equal piles. 9 blocks cannot be placed into two equal piles.) Which groups have an even number of blocks? (The group with 6 blocks and the group with 8 blocks have an even number of blocks.) Which groups have an odd number of blocks? (The group of 7 blocks and the group of 9 blocks have an odd number of blocks.) Which groups could be counted by twos?" (The groups with an even number of blocks could be counted by twos.)

GETTING STARTED 2:

Prepare and display a one hundred chart. Ask a student to circle all the even numbers in the first row. Ask other students to continue this procedure for each remaining row of numbers. Say, "What do we call the numbers that are not circled? (They are odd.) Are there any numbers that are neither odd nor even? (No.) What pattern do you notice? (All the circles line up.) What digits can be in the ones place for even numbers? (There can be a 0, 2, 4, 6, or 8 in the ones place for even numbers.) What digits can be in the ones place for odd numbers?" (There can be a 1, 3, 5, 7, or 9 in the ones place for odd numbers.)

4.01.04

4.01.04.01 define an even number as a number which is divisible by 2 or when divided by 2 leaves no remainder

STRATEGY 1: Prepare and distribute 30 interlocking cubes (chips, blocks) to each group of students. Say, "What numbers can you represent with these cubes? (We can represent any number from 1 through 30 with these cubes.) Using your cubes, 2 at a time, find out which numbers you can represent."

e.g., 
2 4 6 8 10

Say, "What kinds of numbers were you able to make using groups of 2? (We made only even numbers with groups of 2 cubes at a time.) An even number can always be divided into groups of 2 with no remainder." Write on the chalkboard and say, "When you divide an even number by two, there is no remainder." Ask the students to write this information in their notebooks. Say, "Can you make the number 16 using only twos? (Yes.) How many twos will there be? (There will be 8 twos.) Since there are no remaining cubes, 16 is an even number. Why isn't 17 an even number?" (When we divide 17 into groups of 2, there is 1 cube remaining. Therefore, 17 is not an even number.)

Repeat this procedure with other numbers.

STRATEGY 2: Prepare and display the one hundred chart used in Getting Started 2. Say, "Look at the circled numbers. How are they the same? (They are all even numbers.) To be even, what digits can be in the ones place? (There can be a 0, 2, 4, 6, or 8 in the ones place of an even number.) Choose any even number. Divide it by 2. If there is no remainder, we can be sure that the number you chose was even." Ask the students to choose three even numbers and divide them by 2. Say, "Is there a remainder when you divided

4.01.04

STRATEGY 2: those even numbers by 2?" (There was no remainder when the even numbers were divided by 2.)
cont'd

Write a set of even and odd numbers on the chalkboard. Say, "Divide each number by 2. What is the remainder? If there is no remainder, write the word even next to it. If there is a remainder, do not write anything next to it. What do you notice about even numbers?" (Even numbers can be divided by 2 with no remainder.)

4.01.04.02 define an odd number as a number which, when divided by 2, has a remainder of 1

STRATEGY 1: Prepare and distribute a set of interlocking cubes as in Strategy 1, P.O. 4.01.03.01. Say, "Place 7 cubes on your desk. Stack them in groups of 2. What do you notice? (There is one left over.) Place 11 cubes on your desk. Stack them in groups of 2. What do you find? (There is still one left over.) Five and eleven are both odd numbers." Write on the chalkboard and say, "When you divide an odd number by 2, there is always a remainder of 1." Ask the students to record this information in their notebooks.

Say, "What kind of number would it be if there were none left over? (It would be an even number.) What is the remainder if you divide an even number by two? (The remainder is zero.) What is the remainder when you divide an odd number by two? (The remainder is one.) Put any even number of cubes in front of you in stacks of two. Add one more cube. What kind of number do you have? (I have an odd number.) Add one more cube. What do you have now?" (I have an even number.) Ask the students to use their cubes to find all odd numbers from 1 through 30.

4.01.04

STRATEGY 2: Prepare and display the one hundred chart used in P.O. 4.01.03.01, Strategy 2.

Say, "What do we call the circled numbers? (They are even numbers.) What happens when we divide any even number by 2? (When we divide an even number by 2, there is no remainder.) Look at the numbers that come between each pair of even numbers. What kind of numbers are these? (These are odd numbers.) Choose any 4 odd numbers and divide them by 2. What do you notice? (They each have a remainder of 1 when we divide by 2.) Whenever we divide a number by 2 and have a remainder of 1, that number is an odd number." Write several numbers on the chalkboard. Ask students to determine whether those numbers are odd or even by dividing by 2 and looking at the remainder.

4.01.04.03 use an addition chart to determine even and odd sums

STRATEGY 1: Prepare and distribute copies of a blank 10 by 10 addition chart. Ask students to look at the numbers in the top row and the left column and fill in the sums in the appropriate boxes.

e.g.,

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

Say, "How many sums are in each row? (There are 10 sums in each row.) How many rows are there? (There are 10 rows.) If there are 10 rows, with 10 sums in each row, how many sums are on the chart in all? (There are 100 sums on the chart.) Circle only

4.01.04

STRATEGY 1:

cont'd

those sums that are even. How many of the sums did you circle? (We circled 50 sums.) If 50 sums are even numbers, how many of our 100 sums are odd? (There are 50 odd sums.) What fractional part of the sums are even? (50 out of 100 or $\frac{1}{2}$ are even.) Choose any two numbers next to each other going across or down. What do you notice? (One is odd and one is even.) Are there ever two odd or two even sums next to one another on the chart?" (No.)

Repeat this procedure by asking the students to experiment with consecutive numbers vertically or horizontally on the chart until they discover that they will always have an even sum and then an odd sum.

Say, "Choose any even number on your chart. Add 1. What kind of number do you get? (I get an odd number.) Any time you add 1 to an even number, you get an odd number. What kind of number is 1. (1 is an odd number.) Try starting with an even number and adding any odd number. What kind of number is the sum?" (The sum is an odd number.) Elicit and write on the chalkboard, "An even number plus an odd number equals an odd number." Ask the students to start with an odd number and then choose an even number to add to it. Say, "What kind of number is the sum?" (The sum is odd.) Elicit and write on the chalkboard, "An odd number plus an even number equals an odd number."

Repeat this procedure by adding 2 even numbers and then 2 odd numbers. Say, "What do you notice about the sums?" (In both cases the sums were even.) Elicit and write on the chalkboard, "An even number plus an even number equals an even number. An odd number plus an odd number equals an even number." Ask the students to write the rules in their notebooks.

4.01.04

4.01.04.04 determine if differences of even and odd numbers are even or odd

STRATEGY 1: Prepare and display the one hundred chart used in P.O. 4.01.03.01, Strategy 1. Say, "What kind of numbers are circled? (Even numbers are circled.) What have we learned about even numbers? (When we divide an even number by 2 there is no remainder.) What kind of numbers are not circled on this chart? (Odd numbers are not circled.) What have we learned about odd numbers?" (When an odd number is divided by 2, there is always a remainder of 1.)

Ask a student to choose an even number from the chart and write it on the chalkboard. Ask another student to choose another even number that is less than the one written on the chalkboard and to write it below the other even number and subtract.

e.g.,

$$\begin{array}{r} 54 \\ -32 \\ \hline 22 \end{array}$$

Say, "Is the difference of two even numbers even or odd?" (The difference is even.)

Repeat this procedure for subtracting an odd number from an odd number, an even number from an odd number, and a odd number from an even number. Ask students to verbalize their generalization in each case and write the generalization on the chalkboard. Write the following on the chalkboard and ask the students to write it in their notebooks:

$$\begin{array}{r} \text{even} \\ -\text{even} \\ \hline \text{even} \end{array}$$

$$\begin{array}{r} \text{even} \\ -\text{odd} \\ \hline \text{odd} \end{array}$$

$$\begin{array}{r} \text{odd} \\ -\text{odd} \\ \hline \text{even} \end{array}$$

$$\begin{array}{r} \text{odd} \\ -\text{even} \\ \hline \text{odd} \end{array}$$

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Here are 4 consecutive numbers: 6, 7, 8, 9.

How many are odd? _____ How many are even? _____

Here are 10 consecutive numbers:

19, 20, 21, 22, 23, 24, 25, 26, 27, 28.

How many are odd? _____ How many are even? _____

Draw a ring around the numbers below which can be divided by 2 with no remainder.

37 15 26 18 43 52 66 12 81

What kind of numbers are the circled numbers?

Look at the pictures below to find the sums. Write whether they are odd or even.

[illegible]
$$\begin{array}{ccccccc} \square\square\square\square\square & + & \square\square\square\square\square\square\square & = & \square\square\square\square\square\square\square\square\square\square\square\square \\ \hline \text{odd} & + & \text{odd} & = & \hline \end{array}$$
$$\begin{array}{ccccccc} \boxed{}\boxed{}\boxed{}\boxed{} & + & \boxed{}\boxed{}\boxed{}\boxed{} & = & \boxed{}\boxed{}\boxed{}\boxed{}\boxed{}\boxed{}\boxed{}\boxed{} \\ \hline \text{even} & + & \text{even} & = & \hline \end{array}$$

Now try these:

even + _____ = odd

$$\text{odd} + \underline{\hspace{2cm}} = \text{odd}$$

odd + _____ = even

 + even = even

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

1. Jackie had 46 marbles. She arranges them in groups of two. Draw the groups.



Are there any left over? _____ Is 46 odd or even? _____

2. Arrange these coins in sets of two.



Are there any left over? _____ Is the number odd or even? _____ What is the number? _____

3. Divide each number by 2. Is it odd or even?

52 <u>even</u>	31 _____	44 _____	100 _____
73 _____	80 _____	88 _____	36 _____
66 _____	27 _____	89 _____	75 _____

4. Subtract. Write odd or even on each line.

$36 - 21 = \underline{15}$ <u>even</u> - <u>odd</u> = <u>odd</u>	$41 - 15 = \underline{\quad}$ _____ - _____ = _____	$32 - 18 = \underline{\quad}$ _____ - _____ = _____
$3 - 2 = \underline{\quad}$ _____ - _____ = _____	$92 - 42 = \underline{\quad}$ _____ - _____ = _____	$61 - 41 = \underline{\quad}$ _____ - _____ = _____

4.09.02 LINES AND PROPERTIES OF LINES

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

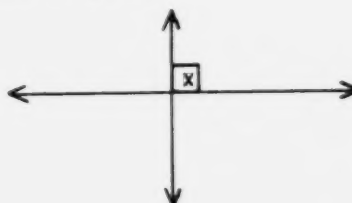
4.09.02.01B

identify intersecting lines as two lines having one and only one point in common; e.g.,



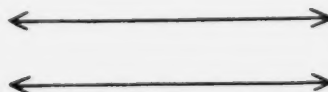
4.09.02.02B

identify perpendicular lines as lines that form right angles; e.g.,



4.09.02.03B

identify parallel lines as two lines that never intersect. e.g.,



VOCABULARY**TERMS**

intersecting lines
perpendicular lines
parallel lines

GETTING STARTED 1:

Prepare and distribute unlined paper and a ruler to each student. Say, "Use your ruler to draw line segment AB. Next, draw line CD. How are a line and a line segment different? (A line goes on and on in each direction; a line segment has a beginning and an end.) How did you represent each on your paper? (I drew arrows to show that the line goes on and on. I did not draw arrows on the segment.) Draw a point on your paper. Label it point X. Draw another point on your paper and label it point Y. Draw a line segment from X to Y. How many straight line segments can you draw from point X to point Y? (We can draw one line segment only.) On another part of your paper draw a ray. How did you represent the ray?" (I drew an arrow on one end to show that a ray goes on and on in only one direction.) Ask several students to draw points, lines, rays, and segments on the chalkboard as the other students draw them in their notebooks.

GETTING STARTED 2:

Prepare and distribute a geoboard, rubber bands, a ruler, and dot paper to each student or group of students. Say, "Use your geoboards and rubber bands to make a line segment, a rectangle, and a triangle. Use your ruler to draw each one on the dot paper exactly as it looks on the geoboard. How many line segments did you need to make the triangle? (I needed three line segments to make the triangle.) How many did you need to make the rectangle? (I needed four line segments to make the rectangle.) What does each nail on the geoboard, or dot on the dot paper, represent?" (They represent points.)

4.09.02

4.09.02.01 identify intersecting lines as two lines having one and only one point in common

STRATEGY 1: Prepare two long pieces of string (ribbon, adding machine tape) and separate the students into two groups. Ask one group to use their string to represent a line. Say, "How did they represent a line? (They extended the string in a straight line.) Does a line really end where the string ends?" (No, a line goes on and on in both directions.) Ask this group to hold their string diagonally across the room. Ask the other group to hold their string diagonally the other way so that the two pieces of string cross each other. Draw a representation of the lines on the chalkboard.

e.g.,



Ask a student to hold the strings at the point where the two strings cross. Say, "At how many points do the strings cross? (They cross at one point.) Why can't they cross again somewhere else?" (They can't cross again because they are moving farther and farther away from each other.) Ask a student to represent this point in the diagram on the chalkboard. Say, "These two lines intersect, or cross, each other. They intersect at one and only one point. They are called intersecting lines." Say and write on the chalkboard: "Lines that cross each other are called intersecting lines." Ask the students to write the definition and draw and label a pair of intersecting lines in their notebooks. Say, "How many angles are formed when two lines intersect?" (4 angles are formed when two lines intersect.) Ask the students to point out the 4 angles on the chalkboard. Say, "How can we describe

4.09.02

STRATEGY 1: intersecting lines?" (Intersecting lines are lines that cross each other.)
cont'd

STRATEGY 2: Prepare and distribute geoboards and rubber bands to each student or group of students. Write on the chalkboard and say, "Intersecting lines are lines that cross each other at one point." Use your geoboard and rubber bands to show two lines that cross each other at only one point." After the students have shown two intersecting lines on their geoboards, ask several students to draw pairs of intersecting lines on the chalkboard. Say, "When two lines intersect, how many angles are formed?" (When two lines intersect, four angles are formed.) Ask the students to write the definition of intersecting lines and draw a pair of intersecting lines in their notebooks.

4.09.02.02 identify perpendicular lines as lines that form right angles

STRATEGY 1: Prepare two pieces of string (ribbon, adding machine tape). Ask two students to use a piece of string to represent a line through the center of the room from side to side. Ask two other students to use another piece of string to represent a line through the center of the room from front to back. Draw a representation of the lines on the chalkboard.
e.g.,



Say, "At how many points do these lines cross? (They cross at one point.) What can we call these lines? (They are intersecting lines.) How many angles are formed where the lines intersect? (4 angles are formed where the lines intersect.) What is the same

STRATEGY 1:
cont'd

about these angles?" (The angles formed by these intersecting lines are all right angles.) Ask the students to point out the 4 right angles on the chalkboard. Write on the chalkboard and say, "Lines that intersect to form right angles are called perpendicular lines." Ask the students to write this definition and to draw a pair of perpendicular lines in their notebooks.

Draw several sets of intersecting lines on the chalkboard, some of which are perpendicular.

e.g.,



Ask a student to draw a ring around the pairs of perpendicular lines. Repeat this procedure with other pairs of intersecting lines. Say, "What is special about perpendicular lines?" (Right angles are always formed where perpendicular lines cross.)

STRATEGY 2:

Prepare and distribute geoboards and rubber bands to each student or group of students. Say, "Perpendicular lines are intersecting lines that form right angles where they intersect." Draw a pair of perpendicular lines on the chalkboard. Say, "How many angles are formed when lines intersect? (There are four angles formed when lines intersect.) What is special about the angles formed by perpendicular lines? (The angles are right angles.) Use your geoboards to show two lines that are perpendicular to each other." After the students have represented perpendicular lines on their geoboards, ask several students to draw perpendicular lines on the chalkboard. Say, "How do we know these lines are perpendicular?" (They are perpendicular because they form right angles where they meet.) Say and write on the chalkboard, "Perpendicular lines are special

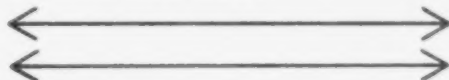
4.09.02

STRATEGY 2: kinds of intersecting lines. Four right angles are formed where perpendicular lines cross." Ask the students to write this definition and to draw an example of perpendicular lines in their notebooks.

4.09.02.03 identify parallel lines as lines that never intersect

STRATEGY 1: Prepare two pieces of string (ribbon, adding machine tape). Ask two students to hold one string lengthwise across the front of the room. Ask two other students to hold their string lengthwise across the back of the room. Draw a representation of the lines on the chalkboard.

e.g.,



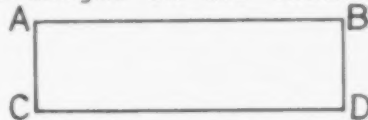
Say, "At how many points do these lines cross?

(These lines don't cross at all.) Why can't we call them intersecting lines or perpendicular lines?

(Intersecting and perpendicular lines must cross each other.) If we continued these lines further, would they cross? (They don't look like they will ever cross.) We have a name for these special lines that never cross. They are called parallel lines." Say and write on the chalkboard, "Parallel lines never intersect. They are always the same distance apart." Ask the students to read the definition, write it in their notebooks, and draw a pair of parallel lines in their notebooks.

Draw a rectangle on the chalkboard.

e.g.,



Say, "Look at this rectangle. Line segments, as well as lines, can be parallel. What are the names of the four line segments that make up this rectangle? (The segments are $\overline{AB}$, $\overline{BD}$, $\overline{CD}$, and $\overline{AC}$.) Which line segments are parallel to each other? ($\overline{AB}$ is parallel

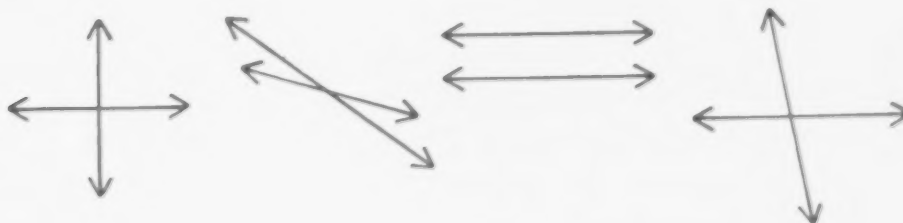
4.09.02

STRATEGY 1: to $\overline{CD}$ and $\overline{AC}$ is parallel to $\overline{BD}$.) Can you think of an example of parallel lines?" (An example of parallel lines would be train tracks, opposite sidewalk curbs on the same street, ...)

STRATEGY 2: Prepare and distribute geoboards and rubber bands to each student or group of students. Say, "Place a rubber band across the nails at the top of the geoboard to represent a line. Do the same across the nails along the bottom of the geoboard?" Ask several students to place their geoboards next to each other so that the rubber band "lines" appear to continue. Say, "As the lines go on and on do you think they will ever cross? (No.) Lines that go on forever and never cross each other are called parallel lines." Write this definition on the chalkboard and ask the students to write it in their notebooks along with an example of parallel lines.

Say, "Can you find something in the classroom that can represent parallel lines or parallel line segments?" (Accept any reasonable responses, e.g., the border along the top of the chalkboard and the chalk ledge, the left and right sides of the window frame, ...)

Draw several pairs of lines on the chalkboard. Ask students to identify each pair of lines as intersecting, perpendicular, or parallel. e.g.,



NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

1. Connect the points to show the following:

a.) two intersecting lines

A. .C

B. .D

Name the lines:

AD and BC

b.) two perpendicular lines

G.

F.

.J

H.

Name the lines:

_____ and _____

c.) two parallel lines

K.

.L

M.

.N

Name the lines:

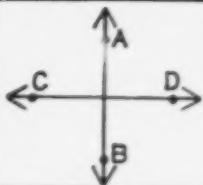
_____ and _____



2. a.) What kind of lines are these? _____

b.) At how many points do the lines intersect? _____

c.) Name the point where they intersect. _____

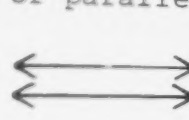


3. a.) What kind of lines are these? _____

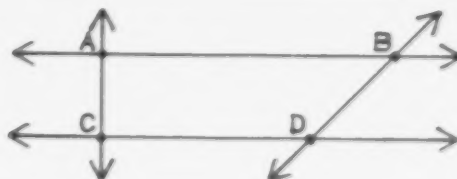
b.) How many right angles are formed where they intersect? _____

4. Draw two parallel lines below.

5. Label each set of lines as intersecting, perpendicular, or parallel.



CHALLENGE!



a.) Name the parallel lines. _____ and _____.

b.) Name the perpendicular lines. _____ and _____; _____ and _____.

SHARPENING YOUR SKILLS

Units 29, 30

Name: _____ Class: _____ Date: _____

1. A number which, when divided by 2, leaves no remainder is called an _____ number.

2. A number which, when divided by 2, leaves a remainder of 1 is called an _____ number.

3. An even number plus an even number equals an _____ number.

4. An even number added to an odd number equals an _____ number.

5. The sum of two odd numbers will always be an _____ number.

6. The difference of two odd numbers will always be an _____ number.

7. An even number minus an even number equals an _____ number.

8. If we subtract an even number from an odd number, the difference will be an _____ number.

9. Intersecting lines are lines that

- (a) never cross each other.
- (b) cross each other at one point.
- (c) cross each other at two points.
- (d) Not Here

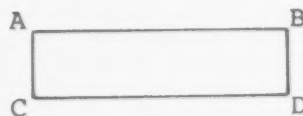
10. Parallel lines are lines that

- (e) never cross each other.
- (f) cross each other at one point.
- (g) cross each other at two points.
- (h) Not Here

11. Right angles are formed by

- (a) intersecting lines.
- (b) parallel lines.
- (c) perpendicular lines.
- (d) Not Here

12. Name the parallel lines in this figure.



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4.07.01 DECIMALS TO HUNDREDTHS

(2-3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

*4.07.01.01A

identify and read a decimal;
e.g.,

0.3

Say, "Three tenths."

4.07.01.02A

write tenths as decimals;
e.g.,

$$\frac{4}{10} = 0.4$$

*4.07.01.03A

count by tenths;
e.g.,

0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7,
0.8, 0.9, 1.0 or 1 whole

4.07.01.04A

write any fraction with a denominator of
100 as a decimal;
e.g.,

$$\frac{27}{100} = 0.27$$

*4.07.01.05A

identify the place value of digits in
decimals through hundredths.
e.g.,

6.31 ———> ones tenths hundredths
 6 . 3 1

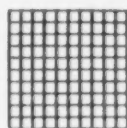
VOCABULARYTERMS

tenths
hundredths
decimal point

GETTING STARTED 1:

Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Say, "We have used our squared material when working with ones, tens, and hundreds. Today we will use our squared material in a different way. We will call the hundred card a large square, the tens strip a strip, and the ones square a small square."

e.g.



large square



strip



small square

Say, "We will think of the large square as one whole. How many strips are needed to equal the large square, or one whole? (Ten strips are needed to equal one whole.) What fractional name can we give to each strip?" (We can call each strip one tenth.) Ask a student to write $\frac{1}{10}$ on the chalkboard. Say, "What name can we give to two strips? ... three strips? ..." (We can call two strips $\frac{2}{10}$, ... three strips $\frac{3}{10}$, ...) Ask the students to write the fractions on the chalkboard.

Say, "How many small squares are needed to equal the large square? (100 small squares equal the large square.) What fractional name can we give to each small square?" (Each small square is $\frac{1}{100}$ of the large square.) Ask a student to write $\frac{1}{100}$ on the chalkboard. Repeat this procedure by naming other hundredths and asking a student to write the corresponding fractions on the chalkboard.

GETTING STARTED 2:

Prepare and display a place value chart with a number represented on it.

e.g.,

thousands	hundreds	tens	ones
2	2	2	2

Ask a student to read the number represented on the chart. Say, "What do you notice about this number? (Each digit is the same.) How do we know that each digit is not worth the same amount? (We know the worth of a digit by its place value.) What happens to each place as we move to the left on the place value chart? (As we move left on the place value chart, each place is ten times greater than the place before it.) What happens to each place as we move to the right on the place value chart?" (As we move to the right on the place value chart, each place is one tenth of the place before it.)

4.07.01

4.07.01.01 identify and read a decimal

STRATEGY 1: Prepare and distribute squared material (hundreds and tens). Say, "If we call the hundred card 1 whole, what can we call each tens strip? (Each strip can be called $\frac{1}{10}$.) Why?" (Each strip is $\frac{1}{10}$ of the whole because 10 strips are needed to equal the whole.) Ask the students to use their strips to represent the fraction $\frac{3}{10}$. Say, "How did you represent $\frac{3}{10}$?" (I used 3 strips to represent $\frac{3}{10}$.) Ask a student to write the fraction $\frac{3}{10}$ on the chalkboard. Ask another student to write $\frac{3}{10}$ in word form on the chalkboard. e.g.,

$\frac{3}{10}$ three tenths

Say, "We can express $\frac{3}{10}$ another way using a decimal point." On the chalkboard write 0.3 and say, "We can read this number as three tenths, also. The decimal point is used to separate the wholes, or whole numbers, from the fractional parts. The zero to the left of the decimal point means there are no wholes. The three to the right of the decimal point means three tenths." Write several decimals on the chalkboard.

e.g.,

0.2 0.9 0.5 0.4

Ask the students to read each decimal, write each along with its word form, and use their strips to represent each amount.

Repeat this procedure with other tenths.

4.07.01.02 write tenths as decimals

STRATEGY 1: Prepare and distribute squared material (hundreds and tens). Say, "If we call each hundred card 1 whole, what name can we give to each strip? (We can call each strip $\frac{1}{10}$ because we need 10 strips to equal the large square, or 1 whole.) Place 4 strips on your desk. What fraction do they represent?" (They

4.07.01

STRATEGY 1:
cont'd

represent $\frac{4}{10}$.) Ask a student to write the fraction $\frac{4}{10}$ on the chalkboard. Say, "Another way to write this is as a decimal." Ask a student to write $\frac{4}{10}$ as a decimal on the chalkboard, e.g., 0.4. Say, "How many wholes are there? (There are 0 wholes.) How many tenths are there? (There are 4 tenths.) Why did you write a decimal point between the 0 and the 4?" (The decimal point separates the whole numbers, or ones, and the tenths.) Ask the students to write the number four tenths two ways in their notebooks.
e.g.,

$$\frac{4}{10} = 0.4$$

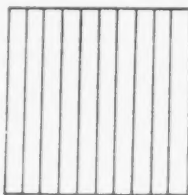
Write another fraction with a denominator of ten on the chalkboard, e.g., $\frac{1}{10}$. Ask the students to represent that fraction using the strips. Ask a student to write the fraction in decimal and word form on the chalkboard as the other students write it in their notebooks.

Repeat this procedure with other tenths.

4.07.01.03 count by tenths

STRATEGY 1: Prepare and display a large square divided into tenths.

e.g.,



Ask a student to shade in one part of the whole square and to write on the chalkboard in decimal form the amount that was shaded. Ask the class to read the number aloud. Repeat this procedure through 9 tenths. As a student shades the last tenth say, "Now the whole square is shaded." On the chalkboard write 1 whole. Say, "We can also write one whole in decimal form." On the chalkboard write 1.0 and say,

4.07.01

STRATEGY 1: "The 1 means 1 whole and the 0 means 0 tenths. We can read this number as 1 or as 10 tenths." Ask the students to count by tenths as they read each decimal number that was written on the chalkboard.

4.07.01.04 write any fraction with a denominator of 100 as a decimal

STRATEGY 1: Prepare and distribute squared material (hundreds and ones). Say, "How many ones, or small squares, are needed to equal the hundred card, or large square? (100 small squares equal the large square.) What fractional name can we give to one of the small squares?" (Each small square is $\frac{1}{100}$ of the large square.) Ask a student to write the fraction $\frac{1}{100}$ on the chalkboard. Say, "What part of the whole would 15 small squares represent?" (15 small squares would represent $\frac{15}{100}$ of the whole.) Ask a student to write the fraction $\frac{15}{100}$ on the chalkboard. Repeat this procedure with other hundredths.

Say, "Just as we can write tenths in decimal form, we can also write hundredths in decimal form. How many digits were to the right of the decimal point when we wrote about tenths? (There was one digit to the right of the decimal point for tenths.) When we write hundredths in decimal form, there will always be two places to the right of the decimal point." Ask a student to read the first fraction on the chalkboard, e.g., $\frac{1}{100}$. Next to the fraction write 0.01. Say, "We read this as one hundredth." Next to the decimal on the chalkboard write one hundredth. Say, "Why couldn't we write the 1 in the first place to the right of the decimal point? (We could not write the 1 in the first place to the right of the decimal point because then it would mean one tenth.) The zero is a placeholder because there are no tenths."

4.07.01

STRATEGY 1:

cont'd

Ask a student to read the next fraction on the chalkboard, e.g., $\frac{15}{100}$. Next to it write $0.15 =$ fifteen hundredths. Say, "Since 15 has two digits, we don't need zero as a place holder to the right of the decimal point as we did with the one hundredth."

Ask the students to represent other hundredths using their small squares (hundredths). Ask several students to write the numbers represented by the squared material as fractions and as decimals on the chalkboard along with the word form of each. Ask the other students to write them in their notebooks.

e.g.,

$$\frac{45}{100} = 0.45 = \text{forty-five hundredths}$$

$$\frac{6}{100} = 0.06 = \text{six hundredths}$$

$$\frac{25}{100} = 0.25 = \text{twenty-five hundredths}$$

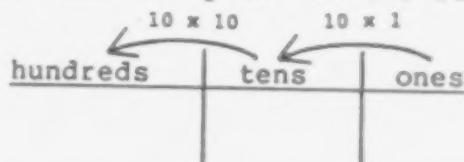
4.07.01.05

identify the place value of digits in decimals through hundredths

STRATEGY 1:

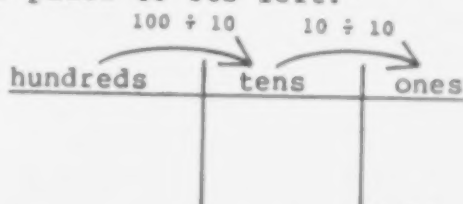
Prepare squared material (1 hundred, 1 ten, and 1 one). Display a place value chart from ones through hundreds. Say, "Moving left on the place value chart is like multiplying by 10. Each place is 10 times greater than the place before it."

e.g.,



Say, "Moving to the right on the place value chart is like dividing by 10. Each place is $\frac{1}{10}$ of the value of the place to its left."

e.g.,



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4.07.01

STRATEGY 1:
cont'd

Display the large square (hundred card). Say, "This represents one whole, or 1. If we divide 1 by 10, we will be dividing 1 into 10 equal parts. What will be the name of each part?" (Each part will be one tenth.) Display the strip called $\frac{1}{10}$ and say, "The column to the right of the ones is called tenths place because that is the amount we get when we divide one by ten." Write tenths in the column to the right of the ones place.

e.g.,

hundreds	tens	ones	tenths

Display the large square (hundred card) and the strip (tens strip). Say, "If we divide one tenth of the whole (the strip) into 10 equal parts, what can we call each part?" (Each part will be equal to a small square, which is $\frac{1}{100}$ of the whole.) Display the small square and say, "We call the next column to the right on the place value chart hundredths because that is the amount we get when we divide a tenth by 10." To the right of tenths on the place value chart, write hundredths.

e.g.

hundreds	tens	ones	tenths	hundredths

Say, "What place is to the right of the ones place? (The tenths place is to the right of the ones place.) What place is to the right of the tenths place?" (The hundredths place is to the right of the tenths place.) Write the following numbers on the chalkboard:

0.5 2.6 13.38 7.49 1.03

4.07.01

STRATEGY 1:

cont'd

Say, "The decimal point is always placed between the ones place and the tenths place." Ask a student to read the first decimal. Say, "In which place does the 0 belong, ... 5 belong?" (The 0 belongs in the ones place. The 5 belongs in the tenths place.) Ask a student to write 0.5 in the place value chart.

Repeat this procedure, asking the students to read the decimal, name the place value of each digit, and write it in the place value chart. When the chart is complete, ask the students to write it in their notebooks.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Draw a line to match the decimal number with the words.

0.2	nine tenths
0.6	three tenths
0.3	four tenths
0.9	six tenths
0.4	two tenths

Write the decimal number for each fraction.

$\frac{8}{10} =$ _____

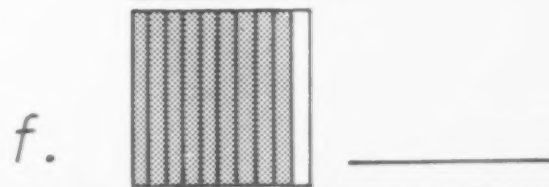
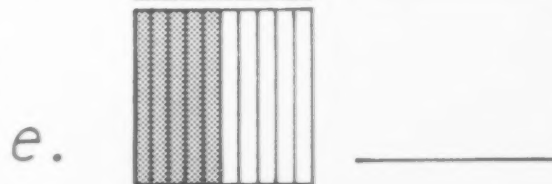
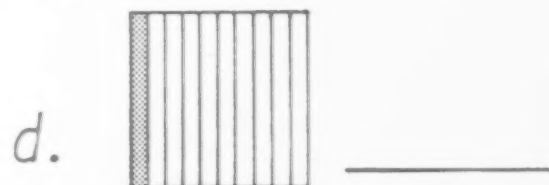
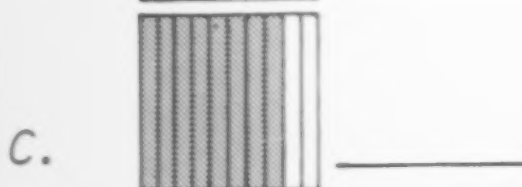
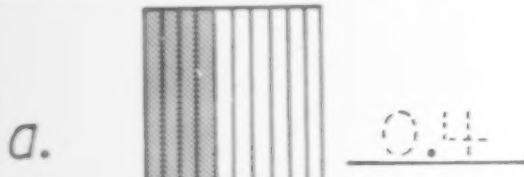
$\frac{1}{10} =$ _____

$\frac{5}{10} =$ _____

$\frac{2}{10} =$ _____

$\frac{9}{10} =$ _____

Write the decimal number for each picture.



Count by tenths. Write the missing numbers.

0.1, 0.2, _____, _____, _____, 0.6, _____, _____, _____, 1 whole

1 whole, 0.9, 0.8, _____, _____, _____, 0.4, _____, _____, 0.1

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Write each fraction below as a decimal.

$\frac{12}{100}$

0.12

$\frac{25}{100}$

$\frac{37}{100}$

$\frac{5}{100}$

$\frac{1}{100}$

$\frac{7}{100}$

$\frac{9}{100}$

Draw a line to connect each fraction with its equivalent decimal form.

$\frac{4}{100}$

0.26

$\frac{22}{100}$

0.99

$\frac{26}{100}$

0.22

$\frac{39}{100}$

0.06

$\frac{99}{100}$

0.39

$\frac{6}{100}$

0.04

Write each of the following in decimal form.

sixty-three hundredths _____

eleven hundredths _____

five hundredths _____

fifty hundredths _____

twenty hundredths _____

seventeen hundredths _____

seventy-two hundredths _____

ninety-nine hundredths _____

Do you remember?

$\frac{3}{4} \times \frac{1}{2} = \boxed{}$

$\frac{1}{4} \times \frac{1}{3} = \boxed{}$

$\frac{1}{2} \times \frac{3}{5} = \boxed{}$

$\frac{2}{3} \times \frac{1}{5} = \boxed{}$

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Match each circled number with its equivalent value.

$$8.\textcircled{4}6$$

$$\frac{4}{1} \quad \frac{4}{10} \quad \frac{4}{100}$$

$$9.0\textcircled{7}$$

$$\frac{7}{10} \quad \frac{7}{1} \quad \frac{7}{100}$$

$$6.2\textcircled{5}$$

$$\frac{5}{100} \quad \frac{5}{10} \quad \frac{5}{1}$$

$$\textcircled{1}.11$$

$$\frac{1}{10} \quad 1 \quad \frac{1}{100}$$

$$2.\textcircled{3}9$$

$$\frac{3}{100} \quad \frac{3}{10} \quad 3$$

$$9.7\textcircled{8}$$

$$\frac{8}{100} \quad 8 \quad \frac{8}{10}$$

Build a Number

6 in the hundredths column
2 in the ones column
1 in the tenths column

The number is _____.

5 in the hundredths column
0 in the ones column
0 in the tenths column

The number is _____.

9 in the tens column
1 in the tenths column
3 in the hundredths column
2 in the ones column

The number is _____.

4 in the ones column
7 in the tenths column
5 in the tens column
1 in the hundredths column

The number is _____.

CHALLENGE!

Look for a pattern in each series of numbers below.
Write the next two numbers in each series.

1, 3, 4, 6, 7, 9, 10, ____, ____

2, 4, 3, 6, 5, 10, 9, ____, ____

18, 9, 10, 5, 6, 3, 4, ____, ____

4.07.02 ORDER DECIMALS

(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.07.02.01A

compare and order two or more decimals using the relation symbols < (less than), > (greater than), = (equal to);
e.g.,

$$0.39 < 0.52$$

$$2.4 > 2.38$$

$$3.5 = 3.5$$

decreasing order 0.5, 0.48, 0.09

increasing order 2.95, 3.08, 3.61

*4.07.02.02A

recognize equivalency of decimals in tenths and hundredths.

e.g.,

tenths tenths hundredths

$$0.5 = .5 \quad 0$$

VOCABULARYTERMS

tenths
hundredths
equivalent

GETTING STARTED 1:

Prepare cards with the following symbols: $<$, $>$, $=$. Write two numbers on the chalkboard, e.g., 386 493. Say, "How do these two numbers compare?" (386 is less than 493.) Ask a student to select the card with the symbol that would make this number sentence true and place it between the numbers on the chalkboard.

e.g.,

386 $<$ 493

Say, "Where did you look to compare these numbers? (I looked at the highest place value, the hundreds. Three hundred is less than four hundred so 386 is less than 493.) What would you do if the hundreds digits were the same?" (I would look at the next place to the right and compare those digits).

Repeat this procedure with other numbers having 3 through 6 digits.

GETTING STARTED 2:

Write a fraction with a denominator of ten on the chalkboard.

e.g., $\frac{4}{10}$

Ask a student to write this fraction as a decimal on the chalkboard. Say, "How do we read both numbers?" (Both numbers can be read as four tenths.) Write $\frac{21}{100}$ on the chalkboard. Ask a student to write this fraction as a decimal on the chalkboard. Say, "How can we read both numbers?" (Both numbers can be read as twenty-one hundredths.)

Repeat this procedure asking the students to express fractions as decimals and decimals as fractions.

4.07.02

- 4.07.02.01 compare and order two or more decimals using the relation symbols < (less than), > (greater than), and = (equal to)

STRATEGY 1: Prepare and distribute squared material (hundreds, tens, and ones) to each student or group of students. Introduce the large squares as ones, the tens strips as tenths, and the small squares as hundredths.

Say, "Use your material to show 4 tenths. Next to that, show 4 hundredths. Which is greater? (4 tenths is greater.) Why is 4 tenths greater than 4 hundredths?" (Even though there are 4 of each, tenths are ten times greater than hundredths.) On the chalkboard write 2.5 $\bigcirc$ 2.25. Say, "Use your material to show 2 and 5 tenths. How did you represent 2 and 5 tenths? (I used 2 large squares and 5 strips.) Next to it show 2 and 25 hundredths. How did you show 2 and 25 hundredths? (I used 2 large squares and 25 small squares.) Which is greater?" (2 and 5 tenths is the greater amount.) Ask a student to complete the inequality.

e.g.,

$$2.5 \bigcirc 2.25$$

Ask the students to read the inequality and write it in their notebooks. On the chalkboard write 0.7 and 0.10. Ask a student to read both numbers aloud. Say, "Which do you think will be greater? What does your squared material show?" (The squared material shows that 7 tenths is greater than 10 hundredths because 7 strips are greater than 10 small squares.) Ask a student to write on the chalkboard an inequality related to the squared material displayed. Ask the other students to write it in their notebooks.

4.07.02

STRATEGY 1: e.g.,

cont'd $0.7 > 0.10$ or $0.10 < 0.7$

Say, "We have been comparing decimals using our squared material. However, we can also compare them without squared material, just as we do whole numbers. How do we compare whole numbers? (We compare the digits in the highest place value. The number with the greatest digit in the highest place value will be the greatest number. If those digits are the same, we look at the digits in the next place to the right.) We can compare decimals in the same way." On the chalkboard write 2.01 $\bigcirc$ 2.10. Say, "Which is the highest place value in this pair of numbers? (The ones place is the highest place value.) What do you notice about the digits in the ones place? (Both numbers have a 2 in the ones place.) What do we do when the digits in the highest place value are the same? (When the digits in the highest place value are the same, we look at the digits in the next place to the right.) What is the next place to the right? (The next place to the right is the tenths place.) What digits are in the tenths place? The digits in the tenths place are 0 and 1.) How do 0 and 1 compare? (0 is less than 1.) Since 0 tenths is less than 1 tenth, how do we compare 2.01 and 2.10?" (2.01 is less than 2.10.) Ask a student to complete the inequality on the chalkboard as the other students write it in their notebooks.

e.g.,

$2.01 < 2.10$

Repeat this procedure with other decimal numbers, comparing two decimal numbers and ordering three or more numbers.

4.07.02

STRATEGY 2: Prepare and display a place value chart.

e.g.,

Tens	Ones	Tenths	Hundredths

Write a word problem on the chalkboard. Ask a student to read it aloud.

e.g.,

A car company tested two cars to see how many miles each car could go on 1 gallon of gas.

These were the results: Car A went 30.7

miles, and Car B went 30.68 miles. Which car traveled farther?

Say, "How can we begin to solve this problem?" (We can write both numbers on the place value chart and compare them.) Ask a student to write the numbers on the place value chart.

e.g.,

	Tens	Ones	Tenths	Hundredths
Car A	3	0	7	
Car B	3	0	6	8

Say, "In which column will we look first? (First we will look at the tens.) Why can't we compare these numbers in the tens column? (We cannot compare the tens digits because they are the same.) In which column will we look next? (We will look at the digits in the ones column.) How do they compare? (They are the same, so we must look at the digits in the tenths column.) How do the digits in the tenths column compare?" (7 tenths are greater than 6 tenths, so the number 30.7 is greater than 30.68.) Ask a student to write an inequality on the chalkboard to show how the numbers compare. Ask the other students to write it in their notebooks.

e.g.,

$$30.7 > 30.68 \quad 381$$

4.07.02

STRATEGY 2:

cont'd

Say, "How did we compare these numbers?" (We compared the digits in each place value column until we found a place where one digit was greater than the other digit in that place.)

Repeat this procedure using other examples to compare two decimals or to order three or more decimals numbers from greatest to least or least to greatest.

4.07.02.02

recognize equivalency of decimals in tenths and hundredths

STRATEGY 1:

Prepare and distribute squared material (hundreds, tens, and ones) to each student, or group of students. Say, "If the large square represents one whole, what do the strips represent? (Each strip is one tenth.) Why? (10 strips make one whole, so each strip is $\frac{1}{10}$ of the whole.) Look at the small squares. What does each small square represent? (The small squares each represent $\frac{1}{100}$ because 100 of them equal one whole.) Use five strips to cover part of the large square. What decimal do the strips represent?" (They represent five tenths.) Ask a student to write the decimal equal to five tenths on the chalkboard, e.g., 0.5. Ask the students to use their small squares to find how many hundredths equal 5 tenths. Say, "How many hundredths equal 5 tenths?" (50 hundredths equal 5 tenths.) Write the following on the chalkboard and ask the students to write it in their notebooks: 5 tenths = 50 hundredths. Say, "How would we express this statement in numerical form?" Elicit and write on the chalkboard: 0.5 = 0.50. Ask the students to write the numerical form in their notebooks below the word form.

Repeat this procedure for 0.2 and 0.20, 0.4 and 0.40 and 1.8 and 1.80. Say, "What do you notice about the

4.07.02

STRATEGY 1: zero at the right end of a decimal?" (The zero at the right end of a decimal doesn't change the value of that decimal.)

STRATEGY 2: Write several fractions with denominators of 10 on the chalkboard.

e.g.,

$$\frac{1}{10}, \frac{3}{10}, \frac{7}{10}, \frac{5}{10}, \frac{9}{10}$$

Say, "Look at the fraction $\frac{1}{10}$. How can we find a fraction that is equivalent to $\frac{1}{10}$?" (We can multiply the numerator and denominator by the same number.) On the chalkboard write $\frac{1}{10} = \frac{10}{100}$. Say, "How many hundredths are equivalent to $\frac{1}{10}$? ($\frac{10}{100}$ are equivalent to $\frac{1}{10}$.) How do you know?" (If the denominator was multiplied by 10 to equal 100, then the numerator must be multiplied by 10, also, to make an equivalent fraction.) On the chalkboard write $\frac{1}{10} = \frac{10}{100}$ and ask a student to write the decimal equivalents below the fractions on the chalkboard as the other students write them in their notebooks.

e.g.,

$$\frac{1}{10} = \frac{10}{100}$$

$$0.1 = 0.10$$

Repeat this procedure with $\frac{3}{10}$. Say, "What can we do to the numerator and denominator to express $\frac{3}{10}$ as hundredths? (We can multiply the numerator and denominator by 10.) How many hundredths are equivalent to $\frac{3}{10}$?" ($\frac{3}{10}$ equals $\frac{30}{100}$.) Ask a student to write these fractions and their decimal equivalents on the chalkboard as the other students write them in their notebooks.

e.g.,

$$\frac{3}{10} = \frac{30}{100}$$

$$0.3 = 0.30$$

STRATEGY 2: Repeat this procedure for the remaining fractions.
cont'd

Say, "What do you notice about each pair of equivalent decimals? (They each have the same digits through tenths place.) What do you notice about the 0 in the hundredths place?" (It does not change the value of the number expressed in tenths.) On the chalkboard write several decimals.

e.g.,

0.4	2.20
3.2	.60
18.6	1.50

For the decimals expressed in tenths, ask the students to write an equivalent decimal in hundredths. For the decimals expressed in hundredths, ask the students to write an equivalent decimal in tenths.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

- ① Gloria ran 100 yards in 14.27 seconds. Joey ran 100 yards in 14.72 seconds. Who ran the 100 yard distance in less time? _____ ran the distance in less time.

Fill in $>$ or $<$. $14.27 \bigcirc 14.72$

- ② Joan ran 3.1 kilometers. John ran 2.93 kilometers. Who ran the greater distance? _____ ran the

Fill in $>$ or $<$. $3.1 \bigcirc 2.93$ greater distance.

- ③ Write $>$, $<$, or $=$ so that each statement is true.

 $0.23 \bigcirc 0.15$ $2.41 \bigcirc 2.50$ $0.73 \bigcirc 0.47$ $0.41 \bigcirc 0.75$ $0.56 \bigcirc 0.91$ $3.9 \bigcirc 3.9$ $2.4 \bigcirc 2.43$ $56.1 \bigcirc 56.19$ $23.1 \bigcirc 2.31$ $0.42 \bigcirc 4.2$ $3.2 \bigcirc 3.2$ $.14 \bigcirc 0.14$

- ④ Write the numbers below in decreasing order.

 $4.1, 4.01, 4.11 \quad \_\_\_ > \_\_\_ > \_\_\_$ $13.6, 13.62, 13.59 \quad \_\_\_ > \_\_\_ > \_\_\_$

- ⑤ Write the numbers below in increasing order.

 $0.17, 0.09, 0.13 \quad \_\_\_ < \_\_\_ < \_\_\_$ $4.31, 4.30, 4.35 \quad \_\_\_ < \_\_\_ < \_\_\_$

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Write each pair of equivalent fractions as equivalent decimals.

$$\frac{6}{10} = \frac{60}{100}$$

$$\frac{5}{10} = \frac{50}{100}$$

$$2\frac{8}{10} = 2\frac{80}{100}$$

_____ = _____ _____ = _____ _____ = _____

Match each decimal in column A with an equivalent decimal in column B.

0.9	3.30
0.4	0.30
0.3	0.90
0.8	0.40
2.2	0.80
3.3	2.20

Express each decimal as hundredths.

$$0.6 = \underline{\hspace{2cm}}$$

$$5.4 = \underline{\hspace{2cm}}$$

$$8.8 = \underline{\hspace{2cm}}$$

$$2.1 = \underline{\hspace{2cm}}$$

$$3.0 = \underline{\hspace{2cm}}$$

Write $>$, $<$, or $=$ so that each statement is true.

$$6.5 \bigcirc 6.50$$

$$8.2 \bigcirc 8.02$$

$$1.1 \bigcirc 1.10$$

$$2.1 \bigcirc 1.20$$

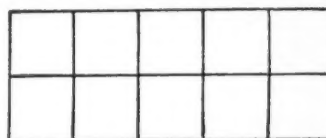
$$3.4 \bigcirc 4.30$$

$$1.1 \bigcirc 1.0$$

$$4.0 \bigcirc 4.00$$

$$6.1 \bigcirc 6.11$$

$$3.9 \bigcirc 4.0$$

CHALLENGE!

How many rectangles can you find? _____

4.12.03 PROBABILITY

(1-2 lessons)

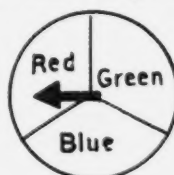
PERFORMANCE OBJECTIVES

The student will be able to...

*4.12.03.01A

determine probabilities by comparing favorable outcomes with total possible outcomes and express as fractions;

e.g.,



This spinner has 3 equally likely outcomes. Since 1 out of the 3 outcomes is red, the probability of spinning red is 1 out of 3 or $\frac{1}{3}$.

4.12.03.02A

determine probabilities where the outcomes are not equally likely and express as fractions;

e.g.,

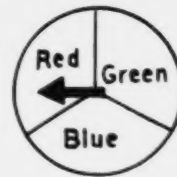


This spinner has 4 equal sections. Three of the sections are green. The probability of spinning green is 3 out of 4 or $\frac{3}{4}$.

4.12.03.03A

predict the outcomes of probability experiments.

e.g.,



If we spin this spinner 30 times, how many times do you think the spinner will land on red?

4.12.03

VOCABULARY

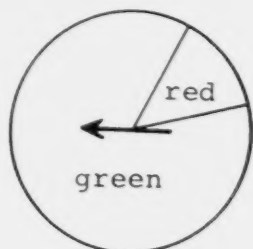
Terms

chance	outcome
equally likely	predict
favorable	probability

GETTING STARTED 1:

Prepare and display a spinner and a tally chart.

e.g.,



Color	Tally of Outcomes
red	
green	

Ask each student to spin the spinner and record the outcome with a tally mark on the chart. When the chart is completed say, "Which color came out more often? (Green came out more often.) How many more times did green come out than red? (Answers will vary depending on tallies.) Why do you think green came out more often? (There was a much larger green area than red area on the spinner.) When one outcome has a better chance of happening than another, we say it is the outcome that is more likely to happen."

Repeat the experiment a second time and compare the outcomes again. Say, "What did you notice? (Green came out more often than red again.) Using this spinner, green will almost always come out more often than red. It is possible for red to come out more often than green, but it is not very likely to happen."

GETTING STARTED 2:

Prepare and display 5 red blocks, 5 blue blocks, and a paper bag. Place 5 red blocks and 1 blue block in the bag and say, "If I asked you to pick a block out of this bag without looking, could you be

4.12.03

GETTING STARTED 2: cont'd

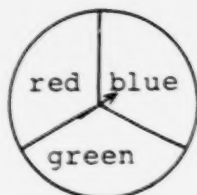
certain that you would pick a red block? (No.) Why not? (If I can't look in the bag when I pick, I might pick a red block or a blue block. I can't be sure which color I will pick.) Which color do you think has the better chance of being picked? (A red block has a better chance of being picked.) Why?" (There are more red blocks than blue blocks in the bag.)

Repeat this procedure with 5 blue blocks and 2 red blocks and again with 5 red blocks and 5 blue blocks.

4.12.03

- 4.12.03.01 determine probabilities by comparing favorable outcomes with total possible outcomes and express as fractions

STRATEGY 1: Prepare and display a spinner with three equal sections, each a different color.
e.g.,



Say, "When we spin this spinner, what outcomes are possible? (It is possible for the spinner to land on red, blue, or green.) What do you notice about the size of each colored area? (Each colored area is equal in size.) Since this spinner has been divided into 3 equal parts, what fractional name can we give each part? (Each part is one third of the spinner.) Does any one color, or outcome have a better chance of occurring than the others? (No.) Why not? (All the possible outcomes are the same size on the spinner.) Let's find the probability of the spinner landing on red. Finding the probability means finding how likely it is that an event will happen. We will call red the favorable outcome because it is the outcome we want to happen. How many places are there for the spinner to land on red?" (There is 1 red area on which the spinner can land.) Write the following on the chalkboard:

$$\text{number of favorable outcomes} = 1$$

Say, "How many possible outcomes are there?" (3 outcomes are possible; red, blue, and green.) Write the following on the chalkboard:

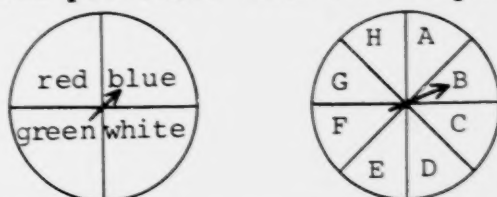
$$\frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} = \frac{1}{3}$$

STRATEGY 1:
cont'd

Say, "The probability of the spinner landing on red is 1 out of 3, or $\frac{1}{3}$. What do you notice about $\frac{1}{3}$? (It is the same number as the fractional part of the spinner that is red.) What will be the probability of the spinner landing on blue?... green?" (The probability of the spinner landing on blue is $\frac{1}{3}$,... green is $\frac{1}{3}$.) Write the probability of each outcome on the chalkboard and ask the students to write them in their notebooks.

Repeat this procedure with other spinners.

e.g.,

**STRATEGY 2:**

Prepare and display 5 blocks, each a different color, and a paper bag.

e.g.,



Say, "We will learn how to tell what the chances are of picking one color, such as green, if we were to place all these blocks in the bag and pick one without looking. We call the outcome we are looking for the favorable outcome. The green block will be our favorable outcome. How many green blocks (favorable outcomes) are there?" (There is 1 green block.) Write on the chalkboard and say, "There is 1 favorable outcome."

Say, "How many blocks are there that have a chance of being picked? (5 blocks have a chance of being picked.) We say these are all the possible outcomes." Write on the chalkboard and say, "There are 5 possible outcomes." Draw a line between the 1 and 5 to represent a fraction.

e.g., There is $\frac{1}{5}$ favorable outcome.
There are 5 possible outcomes.

Ask a student to circle the fraction and read it aloud. Say, "The chance of picking the green block

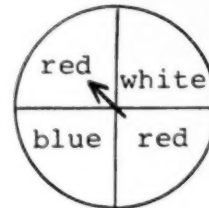
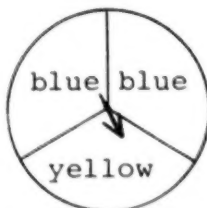
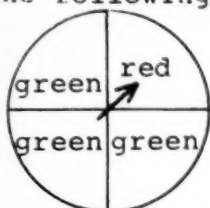
4.12.03

STRATEGY 2: would be 1 out of 5, or $\frac{1}{5}$. What is the probability of picking the black block? (The probability of picking the black block is 1 out of 5 or $\frac{1}{5}$.) What can you say about each block? (The probability of any one of the blocks being picked out of the bag is $\frac{1}{5}$.) Since each block is the same size, shape, and weight, we cannot tell one block from another without looking at the color. Therefore, we say that each block has an equally likely chance of being picked. That does not mean that it must happen 1 out of 5 times. It is not certain, but we have an idea of how likely it is to happen. How do we determine probability?" (We determine probability by thinking of how many favorable outcomes there are and writing that number as the numerator of the fraction. The denominator is the number of all possible outcomes.) On the chalkboard write:
 Probability of an event = $\frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$

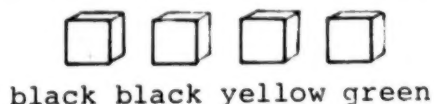
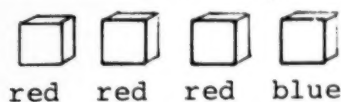
Repeat this procedure with other sets of blocks, e.g., a red block, a blue block, and an orange block.

4.12.03.02 determine probabilities where the outcomes are not equally likely and express as fractions

STRATEGY 1: Adapt Strategy 1, P.O. 4.12.03.01 using spinners such as the following:



STRATEGY 2: Adapt Strategy 2, P.O. 4.12.03.01 using sets of blocks such as the following:



4.12.03

4.12.03.03 predict the outcomes of probability experiments

STRATEGY 1: Prepare a spinner.

e.g.,



Say, "What is the probability of the spinner landing on red? (The probability of the spinner landing on red is $\frac{1}{3}$.) What does a probability of $\frac{1}{3}$ mean? (A probability of $\frac{1}{3}$ means it is likely that red will come up once out of every three spins." Write the following on the chalkboard:

Spin 1

Spin 2

Spin 3

Ask 3 students to each spin the spinner and record the color on the chalkboard under the correct title. Say, "How many times did red come up?" (Answers will vary.) If red came up exactly once out of 3 spins say, "Do you think this will always happen? Try the experiment again and see if it happens exactly the same way." If red came up 2 or 3 times, or did not come out at all, say, "Why do you think that happened? Does red have to come up once out of 3 tries? (No. There is always the chance that it won't happen.) Even though we can't be certain, knowing the probability of an event happening can help us make a good estimate about how many times it will happen. How many times do you think red will come out if we spin the spinner 6 times? ... 9 times. ... 30 times?" Record the predictions. Ask the students to spin and record the outcome each time on the chalkboard. Compare the results to the predictions.

STRATEGY 2: Prepare and display a set of blocks and a paper bag as in Strategy 1, P.O. 4.12.03.01 and draw a table on the chalkboard.

STRATEGY 2: e.g.,
cont'd

Color	Tally of Times Picked
blue	
green	
yellow	
white	
black	

Say, "If we place all the blocks in the bag, what is the probability of choosing the white block? (The probability of picking the white block is $\frac{1}{5}$ or 1 out of 5.) What does that mean? (It means it is likely that white will be chosen once out of every 5 picks from the bag.) It does not have to happen that way, but knowing the chances helps us make a good guess as to the number of times it should happen. If we guess that the white block will be picked 1 time out of every 5 picks, how many times do you think white will come up in 10 picks?" (It will probably come up 2 times out of 10.) Record this and any other predictions on the chalkboard. Place the blocks in the bag. Ask a student to pick a block, record a tally mark in the correct place on the chart, and place the block back in the bag. Repeat this until 10 picks have been made. Say, "We knew that white had 1 chance out of 5 of being picked. From that, we guessed that white might come up twice in 10 tries. How many times did white come up? (Answers will vary.) Was our prediction close to the actual results? Why do you think that happened?" Continue this procedure, making predictions based on probability for how many times white will be picked in 15 picks, 20 picks, and 25 picks. Record the results on the chart and compare the predictions to the results. Say, "Since chance is involved, our predictions may not always be close to the actual results."

NAME: _____

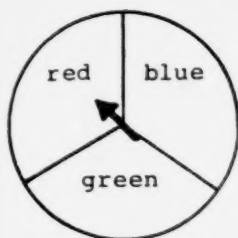
CLASS: _____

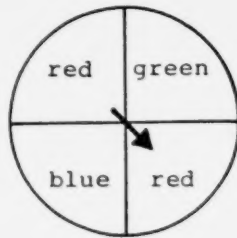
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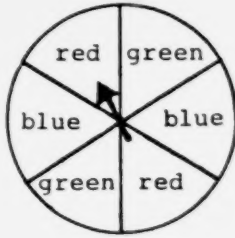
Follow the directions below.

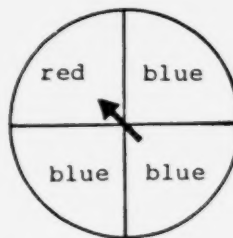
A.

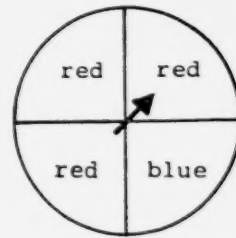
What is the probability that the spinner will land on red on each of the following spinners?



$$\frac{1}{3}$$


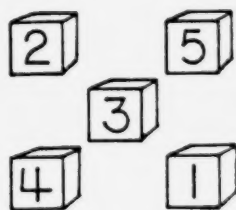


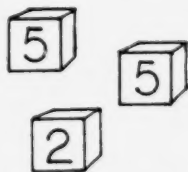


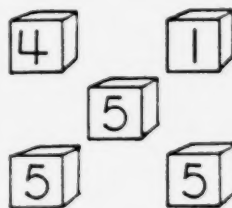


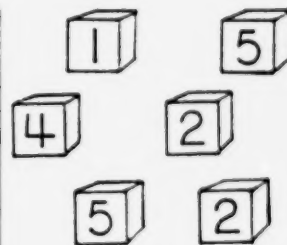
B.

If you were to pick a block from each group below, without looking, what is the probability that you would pick a block with a 5 on it?



$$\frac{1}{5}$$




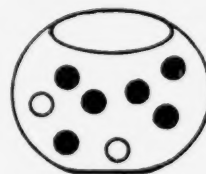


C.

Here are 8 marbles.

How many are black? _____

How many are white? _____



If you were to pick a marble without looking, would you be more likely to pick a white marble or a black marble? _____

What is the probability of picking a white marble? _____

What is the probability of picking a black marble? _____

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

If you toss a coin it can land heads up or tails up.

heads



tails

What is the probability that the coin will land heads up?

What is the probability that the coin will land tails up?

How many times do you think heads will come up if you toss a coin 10 times?

20 times? _____

Now do the experiment. Toss a coin 10 times and tally the results. Compare the results with your prediction. Then continue tossing the coin 10 more times for a total of 20 tosses. Again compare the results with your prediction.

Tossing a Coin

Heads	
Tails	

After 10 tosses: _____ heads and _____ tails.

After 20 tosses: _____ heads and _____ tails.

SHARPENING YOUR SKILLS

Units 31, 32, 33

Name: _____

Class: _____

Date: _____

1. We read the numeral 0.5 as _____.

- (a) five (c) five tenths
(b) five tens (d) Not Here

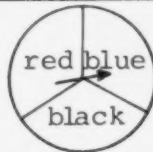
7. 0.2 is equivalent to _____.

- (a) 2.0 (c) 20.0
(b) 0.20 (d) Not Here

2. 

Which is the decimal fraction for the shaded part of this figure?

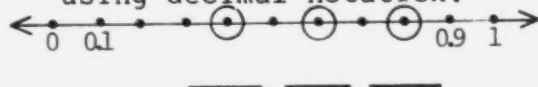
- (e) 0.4 (g) 6.0
(f) 0.6 (h) Not Here

8. 

Which fraction represents the probability of the spinner landing on blue?

- (e) $\frac{1}{2}$ (g) $\frac{1}{4}$
(f) $\frac{2}{3}$ (h) Not Here

3. Label the three circled points on the number line using decimal notation.



4. $\frac{37}{100} = \square$

- (a) 3.7 (c) 0.037
(b) 0.37 (d) Not Here

9. 

What is the probability of the spinner landing on a number less than 7?

- (a) $\frac{1}{4}$ (c) $\frac{3}{4}$
(b) $\frac{2}{4}$ (d) Not Here

5. 4.25

What is the place value of the underlined digit?

- (e) 5 ones (g) 5 hundredths
(f) 5 tenths (h) Not Here

10. 

What is the probability of the spinner landing on an odd number?

Probability = _____

6. Compare each pair of decimals below. Use >, <, or =.

0.84	_____	0.48
2.02	_____	2.20
8.4	_____	8.24
5.27	_____	5.34

11. There are 3 red marbles and 5 blue marbles in a bag. What is the probability that you will pick a red marble?

Probability = _____

4.01.05 PRIME NUMBERS

(3 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.01.05.01A recognize that a prime number has only two factors, one and itself;
e.g.,

2 is a prime number since
2 and 1 are the only factors.

1 is not a prime number since
1 is the only factor of 1.

*4.01.05.02A list all the prime numbers through one hundred;
e.g.,

2,3,5,7,11,13,17,19,23,29,31,37,41,
43,47,53,59,61,67,71,73,79,83,89,97

4.01.05.03A identify a composite number as any whole number having more than two factors;
e.g.,

16 (16 X 1, 4 X 4, 8 X 2)

4.01.05.04A rename a composite number as a product of its primes.
e.g.,

18 = 2 X 3 X 3

VOCABULARYTERMS

factors
product
prime number
divisible
multiples
composite number

GETTING STARTED 1:

Prepare and display a set of oaktag cards for the numerals 1 through 20 on the ledge of the chalkboard. Write a multiplication sentence on the chalkboard, e.g., $2 \times 3 = 6$. Ask a student to read the multiplication sentence aloud. Say, "6 is the product of 2 times 3. What do we call the 2 and the 3 in this multiplication sentence? (2 and 3 are factors.) When 2 and 3 are multiplied together the product is 6. What other numbers when multiplied together equal 6? (6 times 1 equals 6.) Therefore, 6 and 1 are factors of 6, also." On the chalkboard write:

2	x	3	=	6		6	x	1	=	6
factor		factor		product		factor		factor		product

Write a number on the chalkboard, e.g., 8. Say, "Let's see if we can find all of the factors of 8. Remember, the factors will be numbers which, when multiplied together, equal 8." Ask various students to select the appropriate numeral cards that are factors of 8.

e.g.,



Say, "Why are these numbers called factors of 8?" (They are factors of 8 because 4 times 2 equals 8 and 8 times 1 equals 8.) Elicit and write on the chalkboard:

Product	Factors
6	1, 2, 3, 6
8	1, 2, 4, 8
.	
.	
.	

Repeat this procedure using other products through 20.

4.01.05

GETTING STARTED 2:

Prepare and display a set of oaktag cards, each with a different multiplication sentence having a missing factor.

e.g.,

$$4 \times \square = 12$$

Divide the class into 2 teams and say, "Today we will play Guess the Missing Factor. Each team will have a chance to find the missing factor for the multiplication sentences on these cards. If the team member is correct, that team scores a point. If the team member is incorrect, the other team will have a chance to name the missing factor." Play the game until one team scores 10 points.

Repeat this procedure until sufficient practice has been given.

401

4.01.05

4.01.05.01 recognize that a prime number has only two factors, one and itself

STRATEGY 1: Prepare and distribute 12 interlocking cubes (blocks, ones pieces) to each student or group of students. On the chalkboard write $2 \times 3 = 6$ and ask a student to read it aloud. Say, "Today we are going to work with interlocking cubes to find out something very interesting about numbers." Ask the students to use 2 cubes to form a rectangular shape.

e.g.,



Say, "How many different shapes did you make with 2 cubes? (We made only 1 rectangular shape with 2 cubes.) Now, arrange 3 cubes to form a rectangular shape."

e.g.,



Say, "How many different rectangular shapes did you make with 3 cubes?" (We made only 1 rectangular shape with 3 cubes.) Continue this procedure using 4 through 12 cubes. After each rectangular shape has been completed, ask the students to write in their notebooks the corresponding multiplication algorithm for each rectangular shape formed and to circle the factors of each product.

e.g.,

2 cubes



$$= \textcircled{1} \times \textcircled{2} = 2$$

3 cubes



$$= \textcircled{1} \times \textcircled{3} = 3$$

6 cubes



$$= \textcircled{2} \times \textcircled{3} = 6$$



$$= \textcircled{1} \times \textcircled{6} = 6$$

Say, "What did you notice about the number of rectangular shapes for 2, 3, 5, 7 and 11 cubes? (Each of these only formed 1 rectangular shape.) What did you notice about the number of rectangular shapes for 4, 6, 8, 10, and 12 cubes? (Each of these formed more than 1 rectangular shape.) Let's look closely

4.01.05

STRATEGY 1: at our multiplication sentences and each product.
 cont'd How many factors does a product of 2 have? (2 has two factors, 1 and 2.) How many factors do the products of 3, 5, 7, and 11 have? (Each of these products has only 2 factors, 1 and itself.) Any number that has only two factors, 1 and itself, is a special number. It is called a prime number. Why isn't 4 a prime number? 4 is not a prime number because it has more than 2 factors.) Continue this procedure for products of 6, 8, 10, and 12.

Say, "What is a prime number?" (A prime number is a number that has only two factors, one and itself.) Write this definition on the chalkboard and ask the students to write it in their notebooks.

STRATEGY 2: Prepare and display the following chart:
 e.g.,

Product	Factors
2	
3	
4	
5	
.	
.	
.	
12	

Say, "Look at the first product on this chart. In your notebook write a multiplication sentence that will have 2 as the product." Ask a student to write his/her multiplication sentence on the chalkboard, e.g., $1 \times 2 = 2$ or $2 \times 1 = 2$. Say, "What are the factors of 2? (The factors are 1 and 2.) Are there any other pairs of numbers that, when multiplied by each other, will have a product of 2?" (No, there are none.) Ask a student to write the factors on the chart in the appropriate place.

4.01.05

STRATEGY 2: e.g.,

cont'd

Product	Factors
2	1,2
3	
4	
5	
.	
.	
.	
12	

Say, "As we work with different products, we will write the factors of each product. What is the next product on the chart?" (The next product is 3.) Ask the students to write a multiplication sentence in their notebooks that will have 3 as a product. Ask a student to write his/her sentence on the chalkboard, e.g., $1 \times 3 = 3$ or $3 \times 1 = 3$. Say, "Is there any other multiplication sentence where the product is 3? (No.) How many factors does the product 3 have? (3 has two factors.) What are the factors of 3?" (The factors of 3 are 1 and 3.) Write the factors of 3 on the chart in the appropriate place.

Repeat this procedure through the product 12. The completed chart will read as follows:

Product	Factors
2	1,2
3	1,3
4	1,2,4
5	1,5
6	1,2,3,6
7	1,7
8	1,2,4,8
9	1,3,9
10	1,2,5,10
11	1,11
12	1,2,3,4,6,12

4.01.05

STRATEGY 2: Ask a student to come to the chart and use colored chalk to circle all the products that have only two factors, e.g., 2, 3, 5, 7, 11. Say, "These numbers share something very special. Each of them has only two factors, 1 and itself. We call these numbers prime numbers." Using colored chalk, write "prime numbers" next to the circled numbers. Say, "Which numbers from 1 through 12 are prime numbers? (2, 3, 5, 7, and 11 are prime numbers.) Why isn't 6 a prime number?" (6 is not a prime number because it has more than two factors.) Repeat this procedure with the numbers 4, 6, 8, 10, 12. Write on the chalkboard and say, "A prime number has only two factors, 1 and itself." Ask the students to read the definition aloud and write it in their notebooks.

4.01.05.02 list all the prime numbers through one hundred

STRATEGY 1: Prepare and distribute workbook page 45b or ask the students to open their workbooks to that page. Say, "What have we learned about prime numbers? (A prime number has only two factors, 1 and itself.) What is an example of a prime number? (5 is a prime number because its only factors are 1 and 5.) Long ago people discovered a way of finding all the prime numbers. They called this method the Sieve of Eratosthenes (pronounced era-toss-the-nees). We will use the Sieve of Eratosthenes to find all the prime numbers through 100. Look at the first number on the chart on workbook page 45b. Is 1 a prime number? (No.) Why not? (A prime number has two factors, 1 has only one factor.) Cross out 1. Is 2 a prime number? (Yes, it only has 1 and itself as factors.) Circle the number 2 because it is prime. Why can't a multiple of 2 (an even number) be a prime number? (A multiple of 2 will always have 2 as a factor besides 1 and itself.) Cross out all the multiples of 2 on

4.01.05

STRATEGY 1:

cont'd

the chart since they cannot be prime numbers. Look at the number 3 on the chart. Is 3 a prime number? (Yes, it has only two factors, 1 and 3.) Circle the 3 because it is prime. Why can't the multiples of 3 be prime numbers? (A multiple of 3 will always have 3 as a factor besides 1 and itself.) Cross out all the multiples of 3 on the chart. Look at 4. It is already crossed out because it is a multiple of 2 and, therefore, it cannot be a prime number. We will go on to the next number." Repeat this procedure for 5, 7, and 11.

Say, "What do you notice about the multiples of 11? (The multiples of 11 have already been crossed out as multiples of other numbers.) We need to go no further. All the numbers that are still not crossed out are prime numbers. We can circle those numbers." After the students circle the remaining prime numbers say, "How many prime numbers are there from 1 through 100?" (There are 25 prime numbers from 1 through 100.) Ask the students to list all the prime numbers in the second part of workbook page 45b.

4.01.05.03

identify a composite number as any whole number having more than two factors

STRATEGY 1:

Prepare and distribute 12 interlocking cubes to each student or group of students. Ask the students to use 6 cubes to form different rectangular shapes. e.g.,



Draw the different rectangular shapes on the chalkboard. Point to the first shape and say, "What multiplication fact describes this rectangular shape?" (1 times 6 equals 6 describes this shape because there is 1 row of 6 cubes.) Ask a student to write the fact under the picture of the shape on the chalkboard.

4.01.05

STRATEGY 1: e.g.,
cont'd



$$1 \times 6 = 6$$

Repeat this procedure for the remaining shape.
e.g.,



$$2 \times 3 = 6$$

Say, "What are the factors of 6? (The factors of 6 are 1, 2, 3, and 6.) How many factors does 6 have? (6 has four factors.) Why isn't 6 a prime number?" (6 is not a prime number because it has more than two factors.) Write on the chalkboard and say, "Any number that has more than two factors is called a composite number." Ask the students to write this in their notebooks.

Repeat this procedure using the cubes to form rectangular shapes for other numbers, e.g., 4, 8, 10, 12.

STRATEGY 2: Prepare and distribute workbook page 45b or ask the students to open their workbooks to that page. Say, "What is a prime number? (A prime number is a number that has only two factors, 1 and itself.) Which numbers on the chart are prime numbers? (All the circled numbers are prime numbers.) Look at the numbers that have been crossed out. Why did we cross them out? (We crossed them out because they are not prime numbers. They all have more than two factors, except for the number 1.) These crossed out numbers, except 1, are called composite numbers. That means they have more than two factors." Write on the chalkboard and say, "Any number with more than two factors is called a composite number." Ask each

4.01.05

STRATEGY 2: student to select a composite number from the chart and write it in his/her notebook, along with the definition of a composite number. Say, "List all the factors for the number you selected."

cont'd

e.g.,

$$\begin{array}{rcl} \text{Composite} & & \\ \text{number} & & \\ \hline 12 & = & 4 \times 3 \\ & = & 2 \times 6 \\ & = & 1 \times 12 \end{array}$$

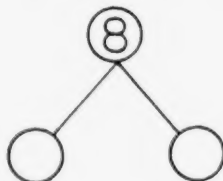
12 has six factors, 4, 3, 2, 6, 1, and 12.

Ask various students to read their composite number aloud and name all its factors. Say, "How is a composite number different from a prime number?" (A composite number has more than two factors. A prime number has only two factors, 1 and itself.)

4.01.05.04 rename a composite number as a product of its primes

STRATEGY 1: Say, "What is a composite number? (A composite number is a number that has more than two factors.) Today we will rename composite numbers using only prime numbers as their factors. What are the factors of the number 8? (The factors of 8 are 8, 1, 2, and 4.) Is 8 a prime number or a composite number? (8 is a composite number.) We will rename 8 using only prime numbers. We will use a diagram to help us." Draw the following diagram on the chalkboard and ask the students to do the same in their notebooks.

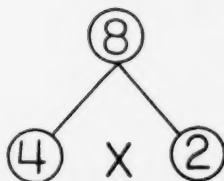
e.g.,



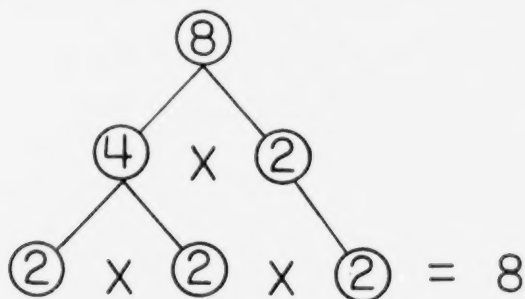
Say, "What pair of numbers other than 8 and 1 can be multiplied to get 8?" (4 and 2 can be multiplied together to get 8.) Ask the students to write the 4 and the 2 in the circles below 8 on the diagram and to write a multiplication symbol between them.

4.01.05

STRATEGY 1: e.g.,
cont'd

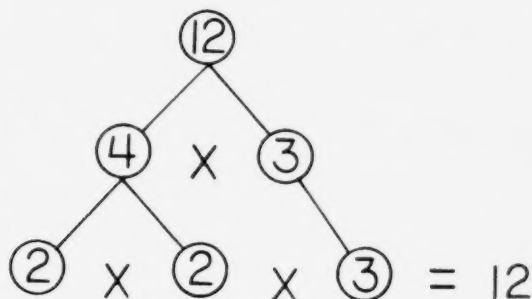


Say, "Are either of the factors, 4 and 2, prime numbers? (2 is a prime number.) Since 2 is a prime number we will leave it alone. Is 4 a prime number? (No, 4 is a composite number.) What two prime numbers can be multiplied together to equal 4?" (2 times 2 equals 4.) Complete the diagram on the chalkboard as the students work in their notebooks.
e.g.,



Say, "We have taken a composite number, 8, and renamed it using only prime numbers. We can say that 8 is equal to $2 \times 2 \times 2$."

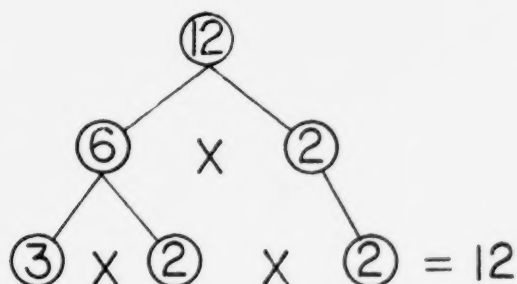
Repeat this procedure using other composite numbers.
e.g.,



Say, "Could we have renamed 12 differently in order to obtain its prime factors? (Yes, we could have renamed 12 as 6 times 2.) Would the final result be

4.01.05

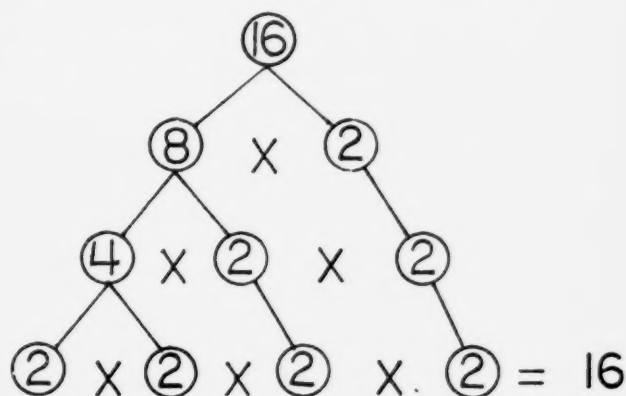
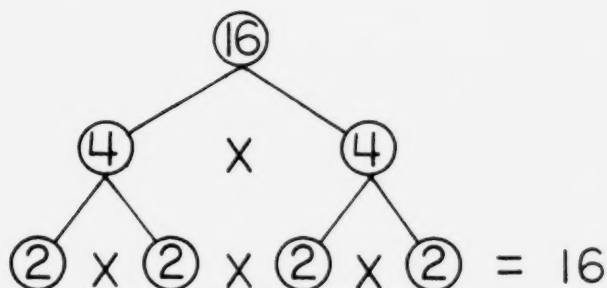
STRATEGY 1: different?" (No, we would still get the same prime factors.) Ask a student to complete the factor diagram using 6 and 2 as factors of 12.
cont'd
e.g.,



Elicit from the students that $2 \times 2 \times 3 = 3 \times 2 \times 2$ because of the associative property.

Similarly elicit the prime factors of 16, encouraging the students to find them in different ways.

e.g.,



Lead the students to discover that the final result of the products of the prime factors of 16 is the same, regardless of the two factors of 16 originally taken.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Remember:

Factors are numbers that, when multiplied together, equal a product.

What are the factors of 3?

$$1 \times 3 = 3 \quad 3 \times 1 = 3$$

The factors of 3 are 1 and 3.

Don't Forget:

A prime number has only 2 factors, 1 and itself.

Write all the multiplication facts for each circled number. Then list all the factors of each number.

7

FACTSFACTORS ARE

8

FACTSFACTORS ARE

17

FACTSFACTORS ARE

12

FACTSFACTORS ARE

11

FACTSFACTORS ARE

15

FACTSFACTORS ARE

Circle yes or no.

Is 7 a prime number? Yes No

Is 12 a prime number? Yes No

Is 8 a prime number? Yes No

Is 11 a prime number? Yes No

Is 17 a prime number? Yes No

Is 15 a prime number? Yes No

NAME: _____ CLASS: _____ DATE: _____

Follow the directions in Strategy 1.

Sieve of Eratosthenes

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

List the prime numbers:

<u>2</u>	<u>3</u>	<u>5</u>	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

Do you remember?

$3 \overline{)96}$	<u>check</u>	$2 \overline{)482}$	<u>check</u>	$4 \overline{)848}$	<u>check</u>
--------------------	--------------	---------------------	--------------	---------------------	--------------

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Let's find all the
factors of 6 .

$$2 \times 3 = 6 \quad 6 \times 1 = 6$$

2, 3, 1, and 6 are factors of 6.

Remember

A composite number
has more than 2 factors.
6 is a composite number.

Write all the multiplication facts for each number.
Then list all the factors of each number.

10FACTSFACTORS ARE16FACTSFACTORS ARE18FACTSFACTORS ARE13FACTSFACTORS ARE19FACTSFACTORS ARE25FACTSFACTORS ARE

Complete each sentence with the word prime or composite.

10 is a _____ number.

19 is a _____ number.

13 is a _____ number.

18 is a _____ number.

16 is a _____ number.

25 is a _____ number.

NAME: _____ CLASS: _____ DATE: _____

Rename each number as a product of its primes. Do not use 1 as a factor.

<pre> graph TD 8((8)) --- 2a((2)) 8 --- 4((4)) 2a --- 2b((2)) 4 --- 2c((2)) 4 --- 2d((2)) </pre>	<pre> graph TD 12((12)) --- 4((4)) 12 --- 3((3)) 4 --- C1(()) 4 --- C2(()) 3 --- C3(()) </pre>
<pre> graph TD 16((16)) --- 4a((4)) 16 --- 4b((4)) 4a --- C1(()) 4a --- C2(()) 4b --- C3(()) 4b --- C4(()) </pre>	<pre> graph TD 18((18)) --- 9((9)) 18 --- 2((2)) 9 --- C1(()) 9 --- C2(()) 2 --- C3(()) </pre>
<pre> graph TD 20((20)) --- C1(()) 20 --- C2(()) </pre>	<pre> graph TD 24((24)) --- C1(()) 24 --- C2(()) </pre>

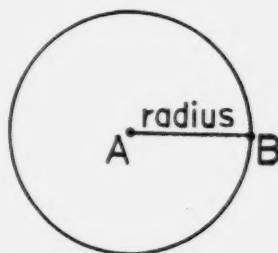
4.09.03 PROPERTIES OF A CIRCLE
(1-2 lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

4.09.03.01B

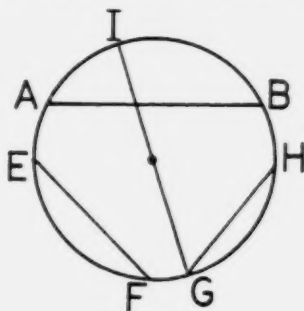
identify a radius of a circle;
e.g.,



$\overline{AB}$ is the radius. The radius is the line segment from the center of the circle to the outer edge of the circle.

4.09.03.02B

identify the chords of a circle;
e.g.,



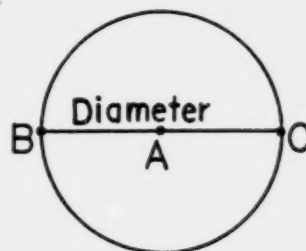
$\overline{AB}$, $\overline{EF}$, $\overline{GH}$, and $\overline{IG}$ are chords because they are line segments whose end points are on the outer edge of the circle.

415

4.09.03.03B

identify a diameter of a circle and compare the diameter of a circle to other parts of a circle.

e.g.,



$\overline{CB}$ is the diameter. It is a line segment that passes through the center of the circle and touches the outer edge of the circle at two points.

The diameter is a special chord that passes through the center of a circle and is the longest chord of the circle.

The length of the diameter is two times the length of the radius.

4.09.03

VOCABULARY

TERMS

radius
radii
diameter
chord
center

GETTING STARTED 1:

Prepare a paper cup, construction paper, and scissors for each student or pair of students. Ask the students to place the paper cup upside down on the construction paper and trace around it.

e.g.,



Say, "What shape did you make? (We made a circle.) Can you find its center? First guess and mark where you think the center is with a pencil dot. Then cut out the circle and check your guess by folding the circle in half and then in half again."

e.g.,



Say, "The place where the two folds meet is the center." After the students fold their paper circles, ask the students to compare the actual center with their estimates.

GETTING STARTED 2:

Prepare several objects which have circular shapes (toys with wheels, records, plates, clocks, ...) or pictures of these objects. Say, "How are these shapes alike?" (All the shapes are round, have a continuous side, and no corners.)

4.09.03

GETTING STARTED 2: cont'd

Draw a round cake and a rectangular cake on the chalkboard. Cut each cake into 8 equal slices.

e.g.



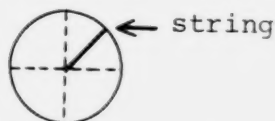
Ask the students to compare the two cakes. Elicit that the round cake has a center, a continuous side, and no corners. The rectangular cake is made up of line segments and has corners. Ask a student to locate the center of the round cake and elicit that all the slices come from the center.

4.09.03

4.09.03.01 identify a radius of a circle

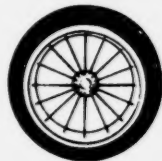
STRATEGY 1: Prepare a piece of string and a large circle cut from construction paper. Say, "How did we find the center of a circle?" (To find the center of a paper circle, we folded the circle in fourths. The point where the folds met was the center.) Ask a student to find and mark the center of the large circle by folding it into fourths. Give the student a length of string and ask him/her to extend the string from the center to the edge of the circle.

e.g.,



Say, "This length of string is a line segment which goes from the center of the circle to the outer edge. It is called a radius of this circle." Write on the chalkboard and say, "A line segment from the center of a circle to the outer edge is called a radius." Ask the students to write this definition in their notebooks. Ask several students to extend the string from the center to other points along the edge. Say, "If we have more than one radius, they are called radii. A circle can have many radii. What do you notice about the radii within this circle?" All radii of the same circle have the same length.) Draw a picture of a bicycle wheel on the chalkboard.

e.g.,



Say, "How are the spokes of the wheel the same as the radii of a circle? (The spokes of the wheel go from the center of the wheel, which is a circle, to the outer edge and are the same as the radii.) If one of the spokes measures 10 inches, how could you determine the length of the remaining spokes?" (All the spokes will measure 10 inches because all the radii of the same circle have the same length.)

4.09.03

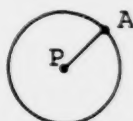
STRATEGY 2: Prepare paper, a ruler, and a compass for each student or group of students. Demonstrate how to use a compass to draw a circle. Ask the students to draw a circle using the compass. Say, "How do you know where the center of the circle is? (The mark left by the compass point is the center of the circle.) Label the center point P."

e.g.,



Say, "Use your ruler to draw a line segment that connects the center and a point on the edge of the circle. You have drawn a radius. Label the radius $\overline{PA}$."

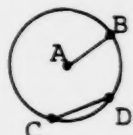
e.g.,



Ask the students to draw and label several other radii in their circles and to measure the length of each radius. Say, "What do you notice about the length of each radius?" (Each radius has the same length as every other radius in that circle.)

Draw a circle on the chalkboard with 2 line segments, one of which is a radius of the circle.

e.g.,

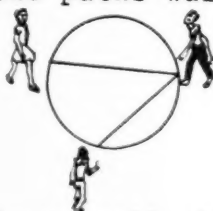


Say, "Which line segment is a radius? (Line segment $\overline{AB}$ is a radius.) Explain." (Line segment $\overline{AB}$ is a radius because it goes from the center of the circle to a point on the edge of the circle. Line segment $\overline{CD}$ does not go from center of the circle to the outer edge, so it is not a radius.)

4.09.03

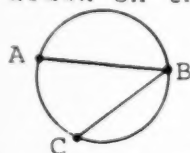
4.09.03.02 identify the chords of a circle

STRATEGY 1: Use string or chalk to make a large circle on the floor. Ask several students to stand around the circle. Say, "We are going to play a game. When your back is tapped you must walk through the circle to another place on the edge of the circle. The student standing at that place must walk to another place on the edge of the circle. The student standing at that place must walk to still a different place on the edge. You will be out if you don't stand on the edge." After several students change places, draw a circle on the chalkboard and illustrate the paths walked by the students.
e.g.,



Say, "What do we call the representation of these paths? (They are called line segments.) How do you know? (Each has two end points.) Where are the end points?" (The end points are on the edge of the circle.) Write on the chalkboard and say, "A line segment that has both end points on the edge of the circle is called a chord." Ask the students to write this definition in their notebooks. Label the paths or chords drawn on the chalkboard.

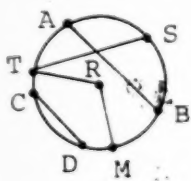
e.g.,



Say, "Line segments $\overline{AB}$ and $\overline{CB}$ are chords."

Draw another circle on the chalkboard with several chords and one line segment which is a radius.

e.g.,



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4.09.03

STRATEGY 1: Say, "Which line segments are chords? ($\overline{AB}$, $\overline{TS}$, and $\overline{CD}$ are chords.) How do you know? ($\overline{AB}$, $\overline{TS}$, and $\overline{CD}$ are chords because their end points are on the outer edge of the circle.) Why isn't $\overline{RM}$ a chord?" ($\overline{RM}$ goes from the center of the circle to the outer edge of the circle and is a radius. It is not a chord because only one of its end points is on the outer edge of the circle.) Is $\overline{TR}$ a chord? (No, $\overline{TR}$ is the same as $\overline{RM}$. It is a radius and therefore not a chord.)

STRATEGY 2: Prepare and distribute a paper circle and a ruler to each student. Say, "Draw a line from one edge of the circle to another. Label the line segment AB ." Ask several students to display their circles. Say, "How are all these line segments different? (They are different in length and in their positions on the circle.) How are they alike? (All the line segments have end points on the outer edge of the circle.) These line segments are called chords." Write on the chalkboard and say, "A chord is a line segment that passes through a circle and whose end points are on the outer edge of the circle." Ask the students to write this definition in their notebooks along with an example of a chord. Say, "What do all the chords you drew have in common? (All the chords are line segments whose end points are on the outer edge of the circle.) How is a chord different from a radius?" (A radius has only one end point on the edge of the circle, the other end point is in the center. All radii in a circle are the same size, but chords can vary in length.)

4.09.03.03 identify a diameter of a circle and compare the diameter of a circle to other parts of a circle

STRATEGY 1: Draw a circle on the chalkboard. Label the center A .

4.09.03

STRATEGY 1: Ask a student to come to the chalkboard and draw a chord in the circle and label it BC. Draw a diameter of the circle and label it DE.

cont'd

e.g.,

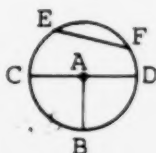


Say, "How are the line segments DE ($\overline{DE}$) and BC ($\overline{BC}$) alike? (Both line segments are chords because their end points are on the outer edge of the circle.) How are they different?" (Line segment DE ($\overline{DE}$) goes through the center and is longer than line segment BC ($\overline{BC}$).) Write on the chalkboard and say, "A line segment through the center of a circle that touches the outer edge of the circle at two points is a special chord called a diameter." Next to line segment DE ($\overline{DE}$) write diameter and ask the students to write the definition of diameter, along with an example, in their notebook.

With a piece of paper, cover one half of the diameter, $\overline{DA}$, revealing only $\overline{AE}$. Say, "What can we call $\overline{AE}$? ($\overline{AE}$ is called a radius of the circle.) How does the diameter compare to the radius? (The diameter goes from one edge of the circle to the other edge and through the center. It is twice as long as the radius.) How can we show that the diameter is two times the length of the radius?" (We can measure the length of each.) Ask a student to verify that the diameter is twice as long as the radius by measuring the radius, $\overline{AE}$, and then comparing it to the measurement of the diameter, $\overline{DE}$.

Draw a circle on the chalkboard with a chord, a 12 inch diameter, and a radius.

e.g.,



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4.09.03

STRATEGY 1:

cont'd

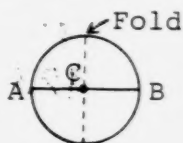
Ask the students to identify line segments $\overline{EF}$, $\overline{CD}$, and $\overline{AB}$. Say, "How are these line segments similar? ... different? ($\overline{EF}$, $\overline{CD}$ and $\overline{AB}$ are line segments with end points. Only the radius, $\overline{AB}$, and the diameter, $\overline{CD}$, go through the center, A. $\overline{EF}$ and $\overline{CD}$ are chords because they go from one edge of the circle to the other edge. $\overline{CD}$ is a special chord called a diameter because it goes through the center.) If the radius of this circle is 6 inches long, how can we determine the length of the diameter without actually measuring it? (We can double the length of the radius because the diameter is two times the length of the radius.) What is the length of the diameter of this circle? (The diameter of the circle is 6 times 2, or 12 inches.) How many diameters does a given circle have?" (A circle can have many diameters.)

STRATEGY 2:

Prepare and distribute a ruler and a paper circle with the center labeled C to each student or group of students. Ask the students to draw a line segment from one edge of the circle to the other edge and through the center C. Ask the students to label this line segment $\overline{AB}$. Say, "What is this line segment called? (It is called a chord.) Why? ($\overline{AB}$ passes through the circle and has both endpoints on the outer edge of the circle.) A chord that passes through the center of a circle is a special chord. It is called a diameter of the circle." Write this definition on the chalkboard and ask the students to write it in their notebooks.

Ask the students to fold their circle in half so that the diameter will be divided into two equal parts. The fold should go through the center.

e.g.,



STRATEGY 2:

cont'd

Ask the students to cover up $\overline{AC}$ with their hands. Say, "What is $\overline{CB}$ called?" ($\overline{CB}$ is called the radius.) How does the length of the diameter compare to the length of the radius? (The diameter is twice as long as the radius.) How do you know?" (When we folded the circle in half, the fold line divided the diameter into two equal parts. Each part was a radius of the circle because they both go from the center to the edge.) Ask the students to draw and label several chords in their circles. Say, "Use a ruler to measure all the chords in your circles, including the diameter. We will compare their lengths to see which chord is longest." Elicit that the diameter is the longest chord of the circle. Draw a circle on the chalkboard with a radius of 4 inches.

e.g.,

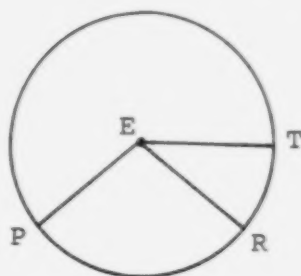


Say, "The radius of this circle is four inches. What is the length of the diameter? Explain. (The diameter is 8 inches long because it is two times the length of the radius.) How is the diameter different from other chords?" (The diameter passes through the center of the circle and is the longest chord of the circle.)

NAME: _____ CLASS: _____ DATE: _____

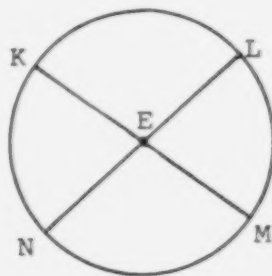
Follow the directions below.

1. In each circle below, point E is the center. Name each line segment that is a radius.

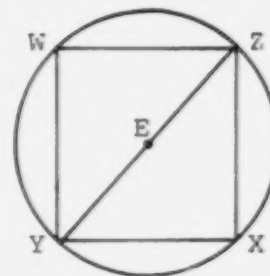


EP ER ET

radii

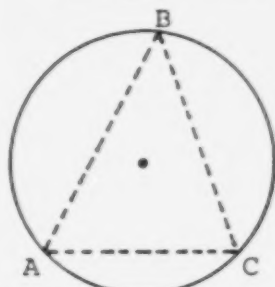


radii



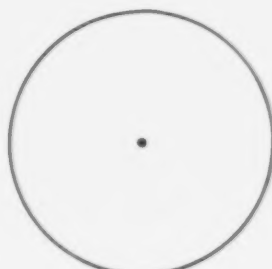
radii

2. Draw a different shape inside each circle using only chords.

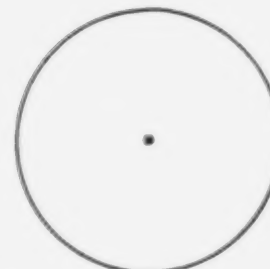


AB AC BC

chords

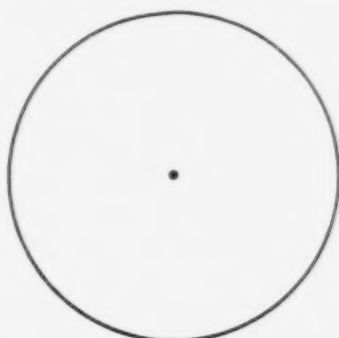


chords

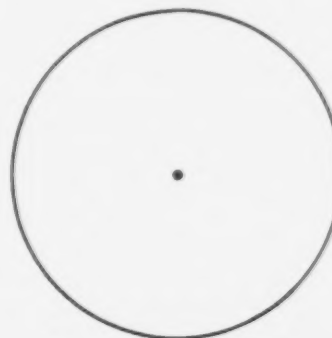


chords

3. Draw 4 radii in the circle below.



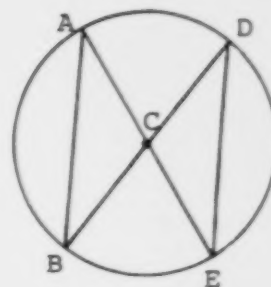
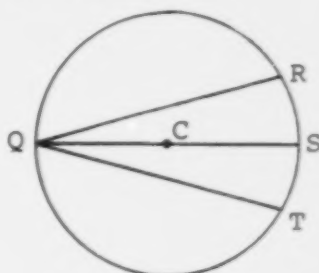
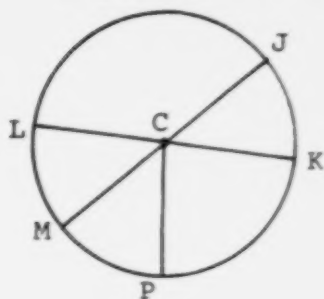
4. Draw 2 chords in the circle below.



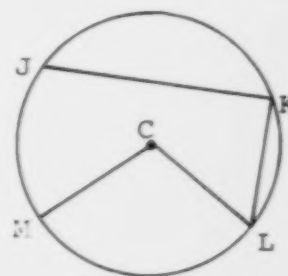
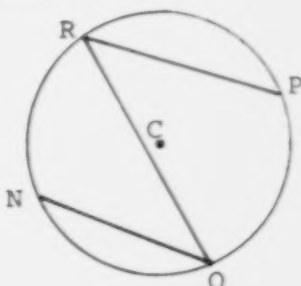
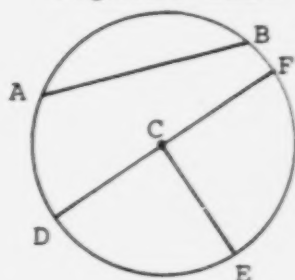
NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

1. In each circle below, point C is the center. Name each line segment that is a diameter.



2. In each circle below, point C is the center. Name each line segment that is a chord.



3. Complete each sentence.

- If the radius of a circle is 6 cm, the diameter is ____ cm.
- If the radius of a circle is 10 cm, the diameter is ____ cm.
- If the diameter of a circle is 18 cm, the radius is ____ cm.
- If the diameter of a circle is 14 cm, the radius is ____ cm.

Do you remember?

For each fraction below, write an equivalent decimal.

$$\frac{8}{10} = \underline{\hspace{2cm}}$$

$$\frac{42}{100} = \underline{\hspace{2cm}}$$

$$\frac{78}{100} = \underline{\hspace{2cm}}$$

$$\frac{9}{100} = \underline{\hspace{2cm}}$$

4.09.04 Polygons

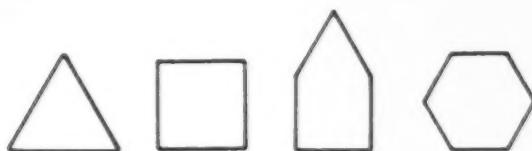
(2 Lessons)

PERFORMANCE OBJECTIVES

The student will be able to...

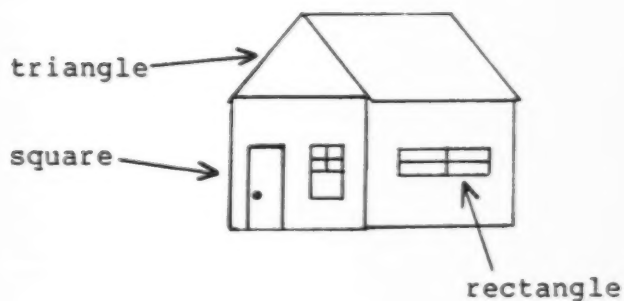
4.09.04.01A

recognize and define a polygon;
e.g.,



4.09.04.02B

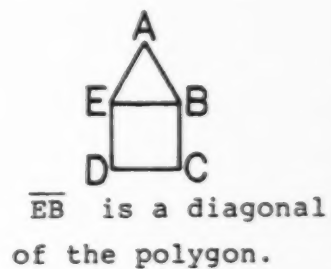
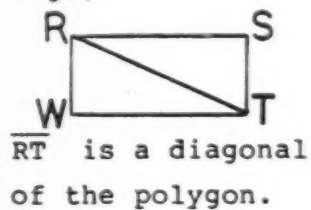
recognize polygons in the environment;



4.09.04.03B

recognize and define a diagonal of a polygon
as a line segment joining any two non-
consecutive vertices.

e.g.,



VOCABULARYTERMS

polygon	quadrilateral
vertex	pentagon
vertices	hexagon
plane	octagon

GETTING STARTED 1:

Prepare and distribute geoboards and rubber bands to each student or group of students. Say, "Join any points along one row, or one column, on the geoboard with a rubber band. What does the rubber band represent? (The rubber band represents a line segment.) What is a line segment?" (A line segment is a part of a line. It has 2 endpoints.) Ask the students to make another line segment that intersects the first line segment. Say, "If your line segments are perpendicular, stand and display your geoboards. Why are these line segments perpendicular?" (These line segments are perpendicular because they form right angles where they intersect.)

Ask the students to clear their geoboards and to use the rubber bands to create various geometric shapes, e.g., triangles, squares, rectangles. As each shape is made, ask the students to describe it in terms of the number of line segments and angles it has. Summarize this information on the chalkboard in chart form.

e.g.,

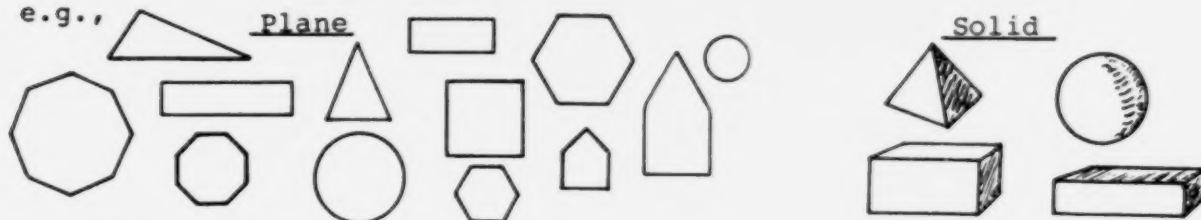
Geometric Shape	Number of Line Segments	Number of Angles
triangle	3	3
square	4	4
rectangle	4	4
.		
.		
.		

4.09.04

GETTING STARTED 2:

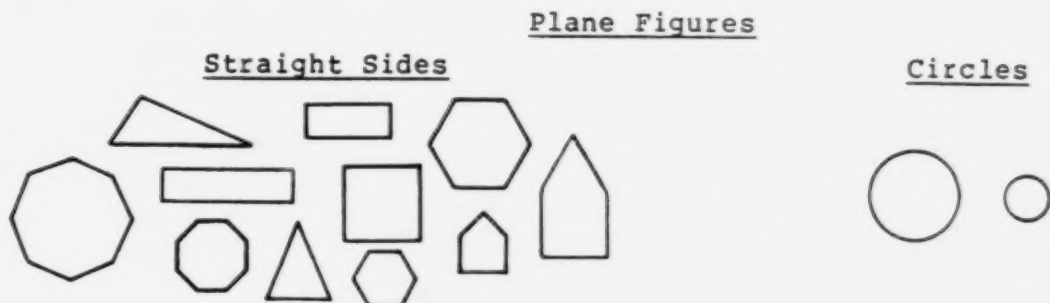
Prepare a box filled with plane and solid figures for each group of students. Ask the students to sort the contents of the box.

e.g.,



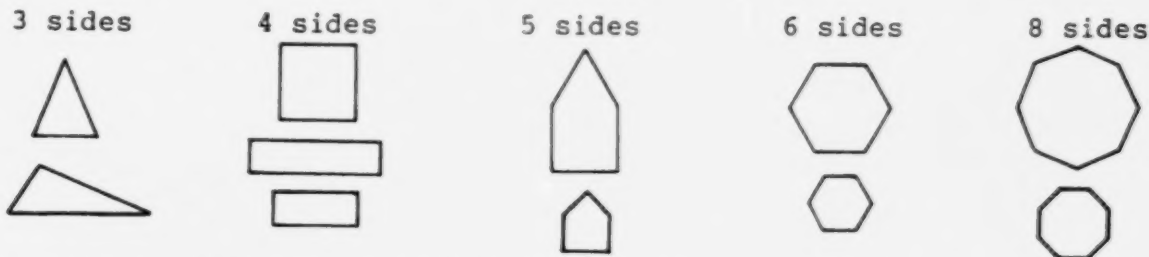
Say, "Why did you sort the contents of the box the way you did? (We placed plane figures in one group and solid figures in the other group.) What is the difference between plane figures and solid figures?" (The plane figures are flat and the solid figures have faces, edges, and thickness.) Ask the students to sort the plane figures into different groups. Say, "Why did you sort the figures in the way you did?" (We placed those with straight sides in one group and circular figures in another group.)

e.g.,



Ask the students to sort the figures with straight sides. Say, "Why did you sort the plane figures with the straight sides the way you did?" (We sorted them by the number of sides in each figure.)

e.g.,

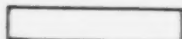


Note: Each sorting may be different from those shown above. Any sorting is acceptable if a reasonable explanation is given.

4.09.04

4.09.04.01 recognize and define a polygon

STRATEGY 1: Prepare geometric figures and pictures of various kinds of fruit, dogs, and vehicles. Display the pictures of fruit. Ask students to name them and list them on the chalkboard under a blank box.
e.g.,

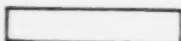


apple
peach
plum
pear

Repeat this procedure with the other pictures. Say, "What name can we give to all the items in the first group?" (We can call the first group fruit.) Write the word fruit in the box above the first column. Repeat this procedure with the second group, dogs, and the third group, vehicles. Say, "While each member of a group is different, it can also be named by the word in the box. The word in the box tells what kind of thing each item is."

Display various figures and ask students to name the shapes. List them on the chalkboard under a blank box.

e.g.,



triangle
rectangle
square
pentagon
hexagon
octagon

Say, "We are going to place a word in the title box. It must be a word to describe all of the figures listed. How are all of the figures the same? (They each have straight sides. The straight sides meet at vertices. They are all simple closed figures.) We

4.09.04

STRATEGY 1: can use one word to describe all of the figures. We can call all of them by the word polygon." Write the word polygon on the chalkboard. Write on the chalkboard and say, "A polygon is a simple closed figure with three or more straight sides." Ask the students to write the definition and the list of polygons in their notebooks.

STRATEGY 2: Prepare and display the following chart and ask a student to read each sentence:

These are POLYGONS.				
These are <u>not</u> POLYGONS.				
Which of these is a POLYGON?				
Draw a POLYGON.				
What is a POLYGON?				

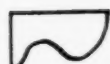
Say, "Look at the first row on the chart. These figures are called polygons. How are all the polygons the same? (They are simple closed figures with straight sides.) Why are each of the figures below the polygons not polygons?" (Accept all reasonable responses.)
e.g.



This is an open figure.



This figure has no straight sides.



This figure has both straight and curved sides.

Say, "Which of the figures in the third row are polygons?" Ask a student to draw a ring around the figures in this row which are polygons.

4.09.04

STRATEGY 2:

cont'd

e.g.,

Which
of these
is a
polygon?



Say, "Why are the circled figures polygons?" (They are like the figures in the first row that are polygons. They are simple closed figures and they have only straight sides.) Ask the students to draw a polygon in their notebooks as several students draw them on the chart. Say, "How would you define a polygon?" (A polygon is a simple closed figure with three or more straight sides.) Write this definition on the chart in the appropriate space and ask the students to write it in their notebooks.

4.09.04.02

recognize polygons in the environment

STRATEGY 1:

Separate the class into two groups. Ask the first group to name an object in the room, e.g., window. The second group must say why it is or is not a polygon.

e.g.,

first team

window

second team

The window is a polygon. It is a rectangle and all rectangles are polygons.

or

The window is a simple closed figure with 4 sides. Therefore, it is a polygon.

·
·
·

The team scores one point for each correct description. Then the second team names an object and asks the first team to tell why it is or is not a polygon.

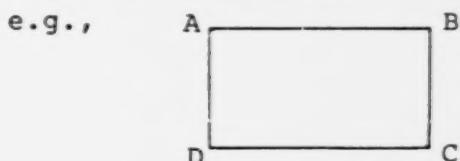
4.09.04

STRATEGY 1: Repeat this procedure until one team scores 15 points.
cont'd

STRATEGY 2: Divide the students into two teams. On the chalkboard write Polygons and Not Polygons as the headings of two columns. Say, Team A will have to think of polygons they see in the classroom. Team B will have to think of figures they see in the classroom that are not polygons. When I say 'go' the first member from each team will come to the chalkboard and write the name of an appropriate object in his/her column. As soon as he/she writes the word, he/she passes the chalk to the next person on the team. The team who correctly lists 15 correct items in their column first is the winner." Play the game until one team wins. The winning team must tell why each of their items is or is not a polygon.

4.09.04.03 recognize and define a diagonal of a polygon as a line segment joining any two non-consecutive vertices

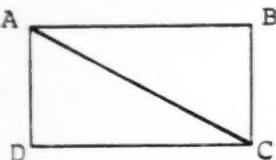
STRATEGY 1: Draw a polygon on the chalkboard.



Ask a student to name each side and each vertex. Say, "Name two consecutive vertices. (A and B are consecutive vertices.) What does it mean to be consecutive? (Consecutive means they come one right after the other with no other vertex in between them.) What are the names of two non-consecutive vertices? (Two non-consecutive vertices are A and C.) Why can A and C be called non-consecutive vertices?" (They are non-consecutive because they do not come one right after the other. There is another vertex, B, between them.) Ask a student to draw a

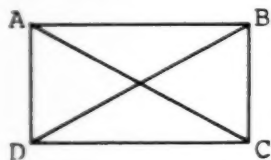
4.09.04

STRATEGY 1: diagonal line connecting vertices A and C.
cont'd e.g.,



Look at line segment AC ($\overline{AC}$). We call line segment AC ($\overline{AC}$) a diagonal because it connects two non-consecutive vertices." Ask a student to construct another diagonal in the polygon on the chalkboard and to write the name of each diagonal.

e.g.,



$\overline{AC}$ is a diagonal.

$\overline{BD}$ is a diagonal.

Say, "What is the name of the diagonal you drew? (The diagonal is called line segment BD ($\overline{BD}$).) Why is $\overline{BD}$ a diagonal of the polygon?" ($\overline{BD}$ is a diagonal because it connects two non-consecutive vertices.) Write on the chalkboard and say, "A diagonal of a polygon is a line segment that joins any two non-consecutive vertices." Ask the students to write this definition in their notebooks along with the diagram on the chalkboard. Repeat this procedure with other polygons.

NAME: _____ CLASS: _____ DATE: _____

Follow the directions below.

Help find the definition of a polygon by crossing out the wrong word.

A polygon is a simple $\begin{pmatrix} \text{closed} \\ \text{open} \end{pmatrix}$ figure with $\begin{pmatrix} \text{two} \\ \text{three} \end{pmatrix}$ or $\begin{pmatrix} \text{more} \\ \text{less} \end{pmatrix}$ straight sides.

Which of the figures below are polygons? Write Yes or No.



Yes _____

List 3 things you see in the classroom and 3 things you see at home which suggest the figure of a polygon.

<u>CLASSROOM</u>		<u>HOME</u>	
<u>OBJECT</u>	<u>POLYGON</u>	<u>OBJECT</u>	<u>POLYGON</u>
1. <u>window pane</u>	<u>rectangle</u>	1. _____	_____
2. _____	_____	2. _____	_____
3. _____	_____	3. _____	_____

CHALLENGE!

Can you find the missing addends?

$$\begin{array}{r} \boxed{} \\ + 271 \\ \hline 615 \end{array}$$

$$\begin{array}{r} \boxed{} \\ + 139 \\ \hline 814 \end{array}$$

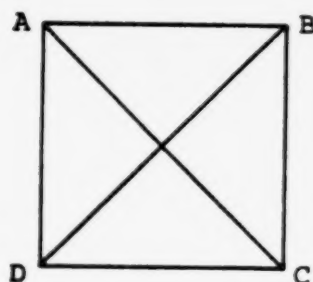
$$\begin{array}{r} \boxed{} \\ + 438 \\ \hline 876 \end{array}$$

$$\begin{array}{r} \boxed{} \\ + 239 \\ \hline 832 \end{array}$$

$$\begin{array}{r} \boxed{} \\ + 295 \\ \hline 701 \end{array}$$

NAME: _____ CLASS: _____ DATE: _____

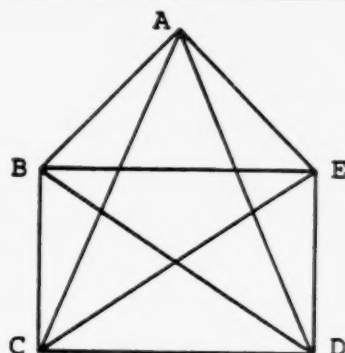
Write the number of diagonals in each figure. Then write the names of each diagonal on the line below the figure.



Given: Polygon ABCD

Number
of
Diagonals _____

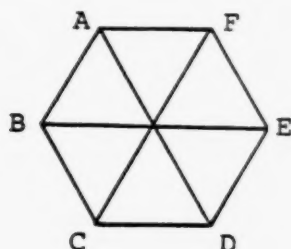
Names
of
Diagonals _____



Given: Polygon ABCDE

Number
of
Diagonals _____

Names
of
Diagonals _____

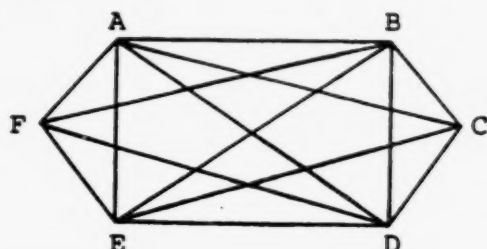


Given: Polygon ABCDEF

Number
of
Diagonals _____

Names
of
Diagonals _____

CHALLENGE!



Given: Polygon ABCDEF

Number
of
Diagonals _____

Names
of
Diagonals _____

SHARPENING YOUR SKILLS

Units 34, 35, 36

Name: _____ Class: _____ Date: _____

1. A number with only two factors, 1 and itself, is called a _____.

2. Which of the following is a prime number?

- (a) 16 (c) 7
(b) 12 (d) Not Here

3. Draw a ring around the prime numbers.

2, 3, 4, 5, 6, 7, 8, 9, 10,
11, 12

4. Name two prime numbers between 20 and 30.

5. Which of the following is a composite number?

- (e) 5 (g) 11
(f) 12 (h) Not Here

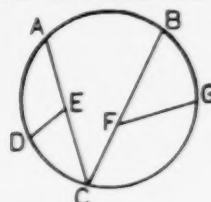
6. $20 = 5 \times 2 \times \square$

- (a) 10 (c) 2
(b) 5 (d) Not Here

7. Which circle shows a radius?

- (e)  (g) 
(f)  (h) Not Here

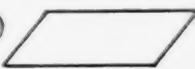
8. Name the chords of this circle.



9. Which circle shows a diameter?

- (a)  (c) 
(b)  (d) Not Here

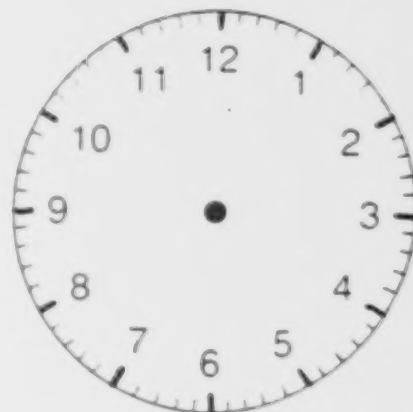
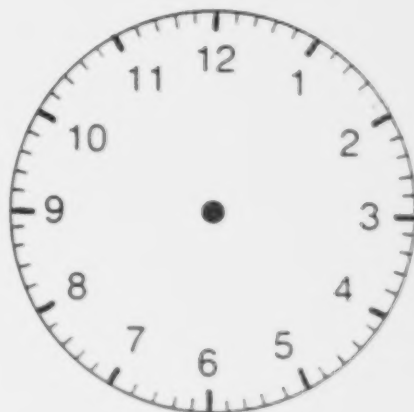
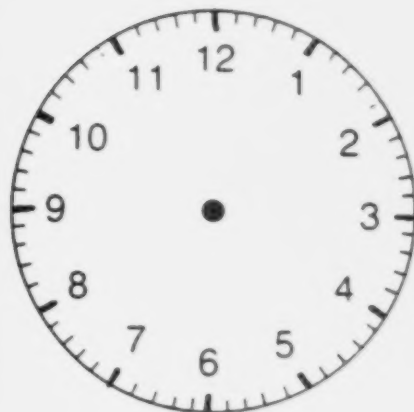
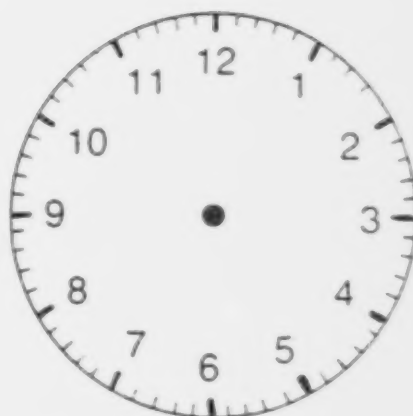
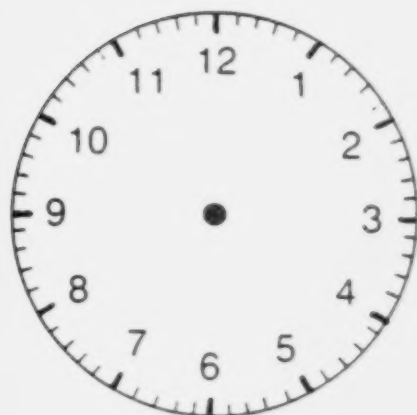
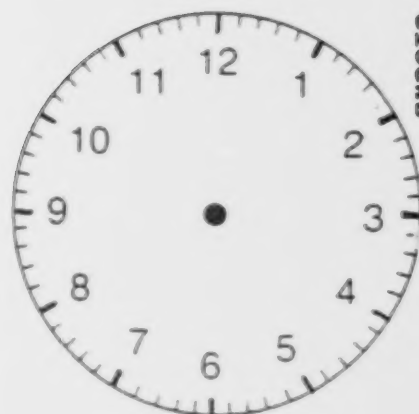
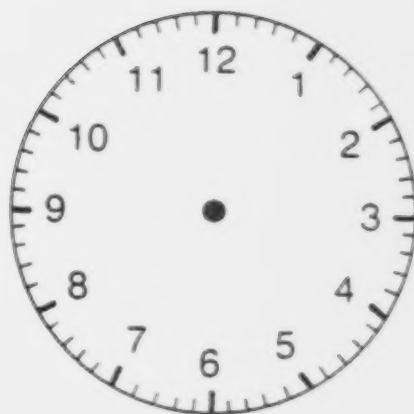
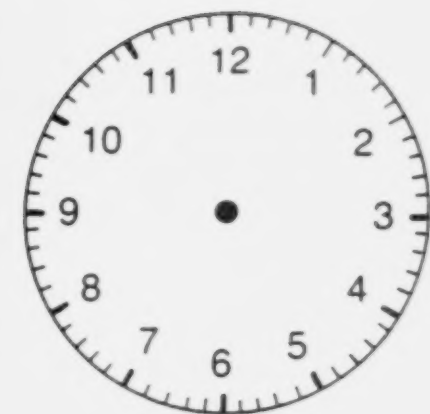
10. Which of the following is not a polygon?

- (e)  (g) 
(f)  (h) 

11. Draw a diagonal of this polygon.



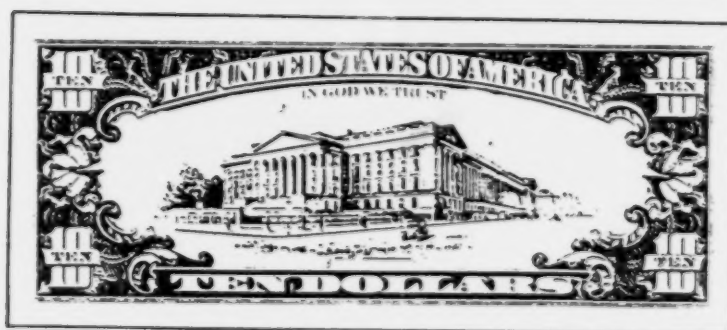
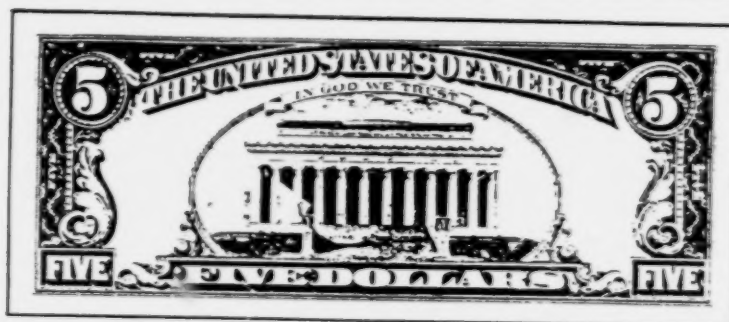
<i>Sunday</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>	<i>Saturday</i>

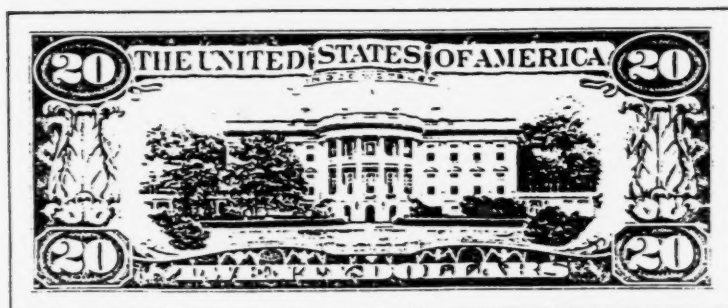


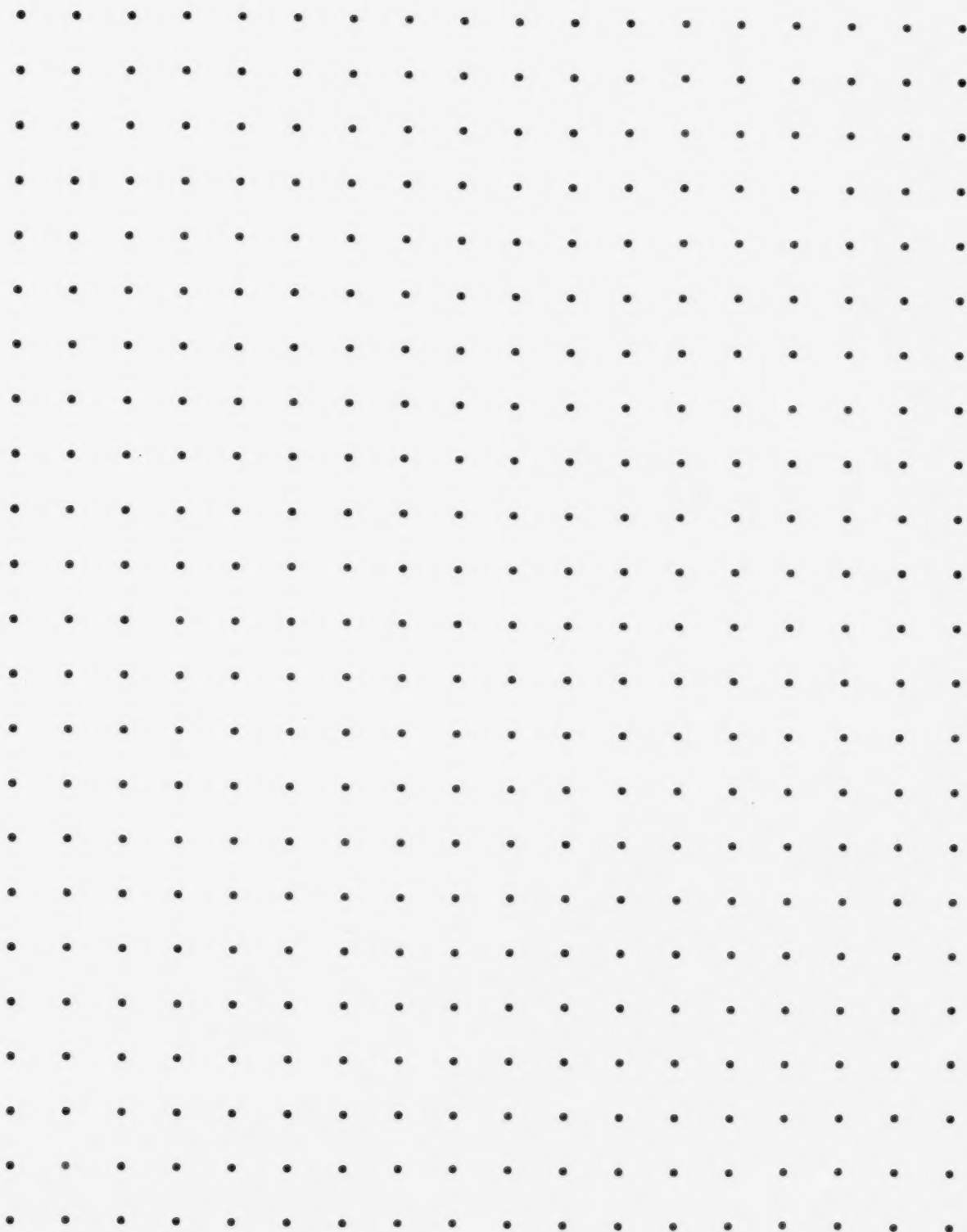
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

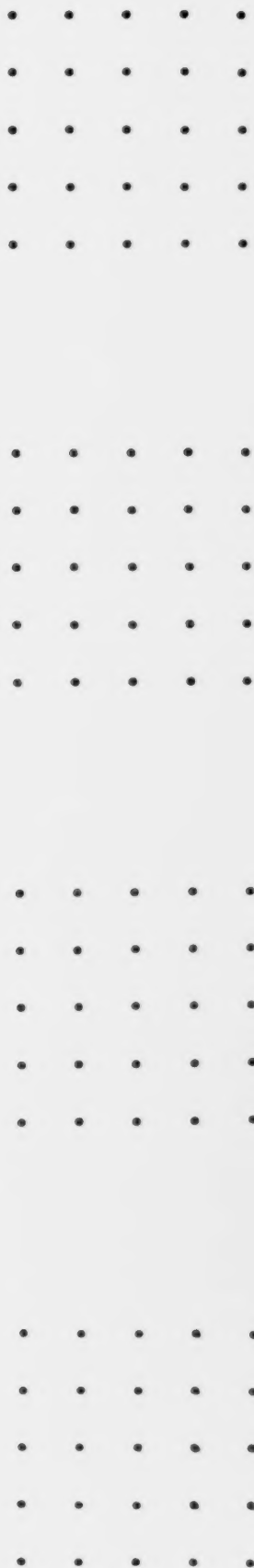




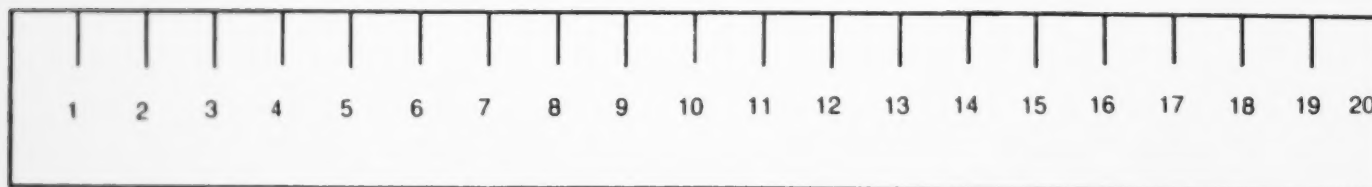
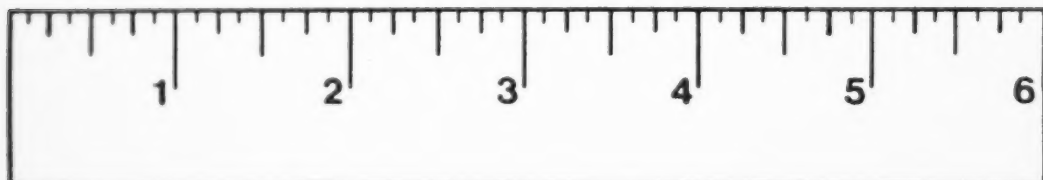
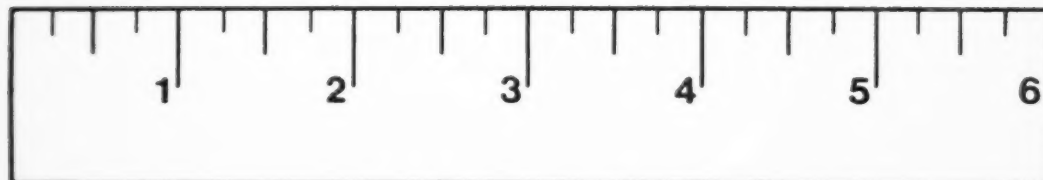


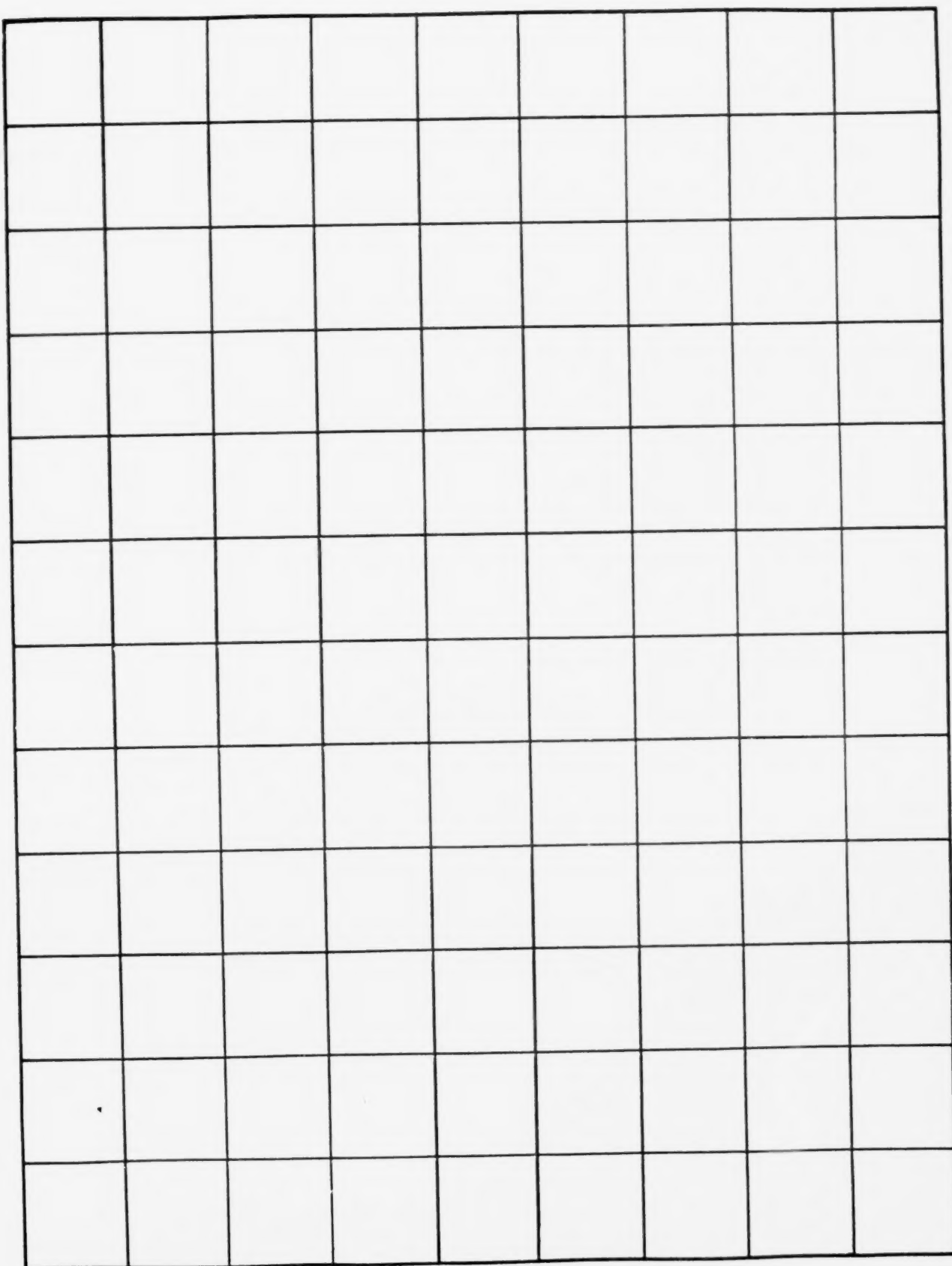






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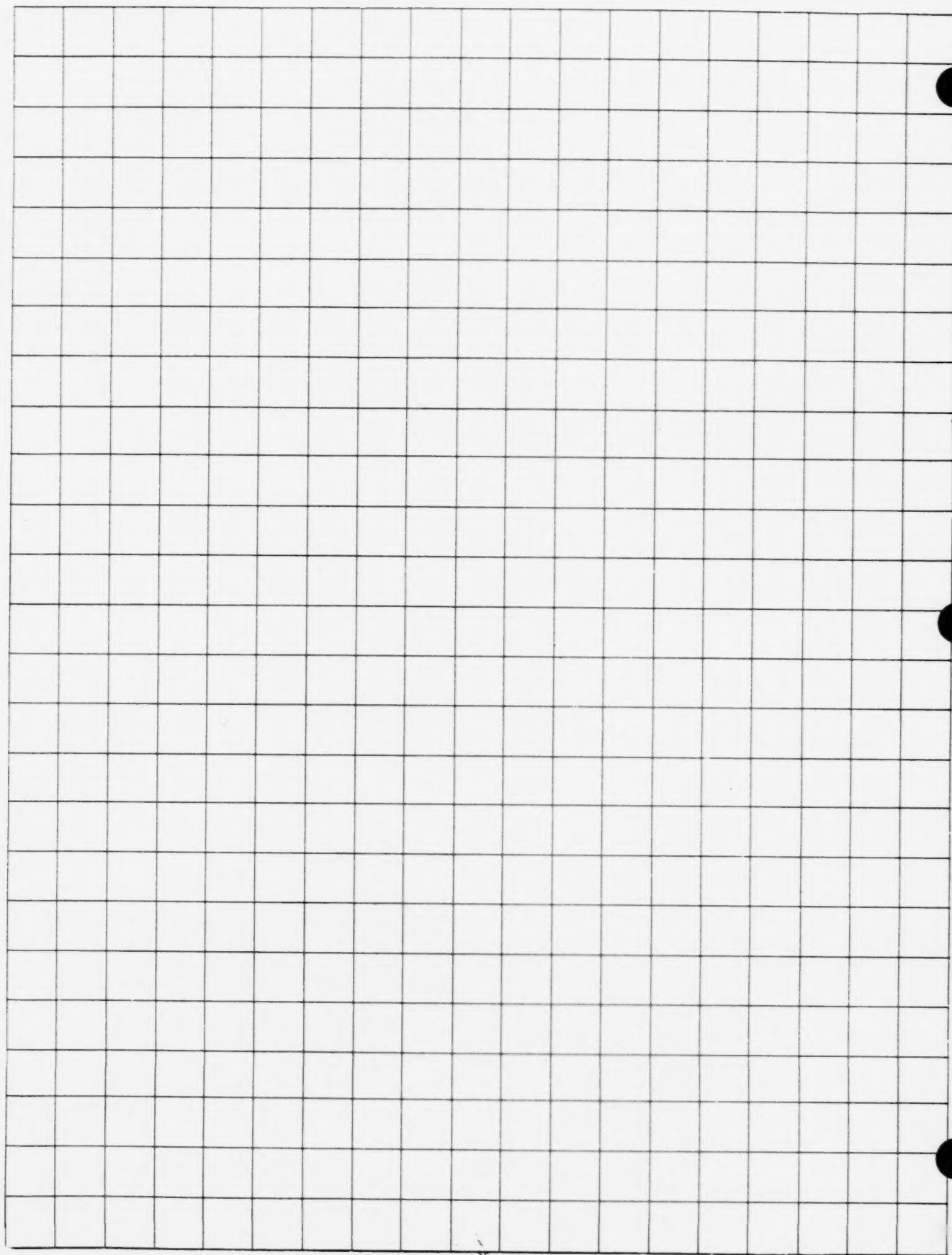


TABLE OF SYMBOLS

DEFINITIONS	SYMBOL	DEFINITIONS	SYMBOL
plus; add; positive	+	line	$\longleftrightarrow$
minus; subtract; negative	-	ray	$\longrightarrow$
plus or minus	+ or -	perpendicular lines	$\begin{array}{c} \updownarrow \\ \square \\ \updownarrow \end{array}$
times; multiply	• or X	parallel lines	$\begin{array}{c} \longrightarrow \\ \longrightarrow \end{array}$
divide	$\div$	degree	°
divide	$\sqrt{\quad}$	equals	=
square root	$\sqrt{\quad}$	is not equal to	$\neq$
cube root	$\sqrt[3]{\quad}$	is less than	<
angle	$\angle$	is greater than	>
between two numerals or letters at the end of a series or sequence; and so on	...	encloses a set when numbers are included; empty set when empty	$\left\{ \quad \right\}$
triangle	$\triangle$	subset	$\subset$
rectangle	$\square$	intersection	$\cap$
parallelogram	$\parallel$	union; join	$\cup$
circle	$\bigcirc$	percent	%
line segment (as $\overline{AB}$)	$\overline{\quad}$	foot, minute	'
		inch, second	"

METRIC TABLE

PREFIX	VALUE	LENGTH	CAPACITY	WEIGHT (MASS)
KILO	1000	kilometer* (km)	kiloliter (kl)	kilogram* (kg)
HECTO	100	hectometer (hm)	hectoliter (hl)	hectogram (hg)
DEKA	10	dekameter (dam)	dekaliter (dal)	dekagram (dag)
	1	meter* (m)	liter* (l)	gram* (g)
DECI	$\frac{1}{10}$ or .10	decimeter (dm)	deciliter (dl)	decigram (dg)
CENTI	$\frac{1}{100}$ or .01	centimeter* (cm)	centiliter (cl)	centigram (cg)
MILLI	$\frac{1}{1000}$ or .001	millimeter* (mm)	milliliter (ml)	milligram* (mg)

BASIC CLASSROOM EQUIPMENT CHECKLIST

MATERIALS:

Abacus - Class size/indiv..... _____

Attribute blocks..... _____

Balance Beam..... _____

Calculators..... _____

Calendar - class size..... _____

Clock - large - class size..... _____

Clock - individual size..... _____

Clock - stamp..... _____

Coin stamps..... _____

Compass..... _____

Cubic counting blocks..... _____

Cuisenaire rods..... _____

Dominoes..... _____

Felt cut-outs..... _____

Flannel board..... _____

Flash cards..... _____

Fractional parts (assorted)..... _____

Geo boards..... _____

Geometric patterns..... _____

Hundred charts - class size/ind. _____

Interlocking cubes..... _____

Laminating paper..... _____

Magnetic board..... _____

Magnetic discs..... _____

Measuring tools-English, Metric
(rulers, scales, compasses,
protractors, beakers, cups,
spoons, thermometers)..... _____

Number lines - class/indiv..... _____

Numerals - tactile..... _____

Plastic discs..... _____

Play money..... _____

Powers of Ten..... _____

Protractor..... _____

SEE calculators..... _____

Scale..... _____

Screen (pull-down type)..... _____

Spinners..... _____

Squared place value material.... _____

Standard playing cards..... _____

Tangrams..... _____

Tens frame..... _____

Timers (1,2,3 minute)..... _____

Tokens (various sizes/colors)... _____

Trundle wheel..... _____

SUPPLIES:

Adding machine tapes (for class-
room/ind. number lines)..... _____

Chalk..... _____

Construction paper..... _____

Elastic bands..... _____

BASIC CLASSROOM EQUIPMENT CHECKLIST

SUPPLIES: cont'd

Envelopes (all sizes).....	Buttons.....
Erasers, board/individual.....	Cardboard (all sizes).....
Felt pens (all sizes).....	Cereal boxes.....
Ditto, Rexograph paper.....	Coffee cans.....
Glue.....	Detergent boxes, shoe boxes, meat trays, and plastic containers.....
Gram weights.....	Egg cartons.....
Graph paper (1 cm, $\frac{1}{2}$, 1").....	Felt for desk mats.....
Grease pencils.....	Ice cream sticks.....
Oak tag.....	Juice containers.....
Paper clips.....	Macaroni.....
Paste.....	Magazines.....
Plastic discs.....	Menus.....
Pointer.....	Metrically measured cartons....
Primary pencils.....	Milk containers.....
Rubber bands.....	Newspapers.....
Scissors - primary, left hand..	Paper plates.....
Scotch tape.....	Sand.....
Spinner.....	Spools.....
String.....	String, yarn.....
Tape.....	Styrofoam.....
	Tongue depressors.....
	Wire hangers.....
	Ziploc Bags.....

COLLECTIBLES:

Beads and beans.....
Bottle caps.....